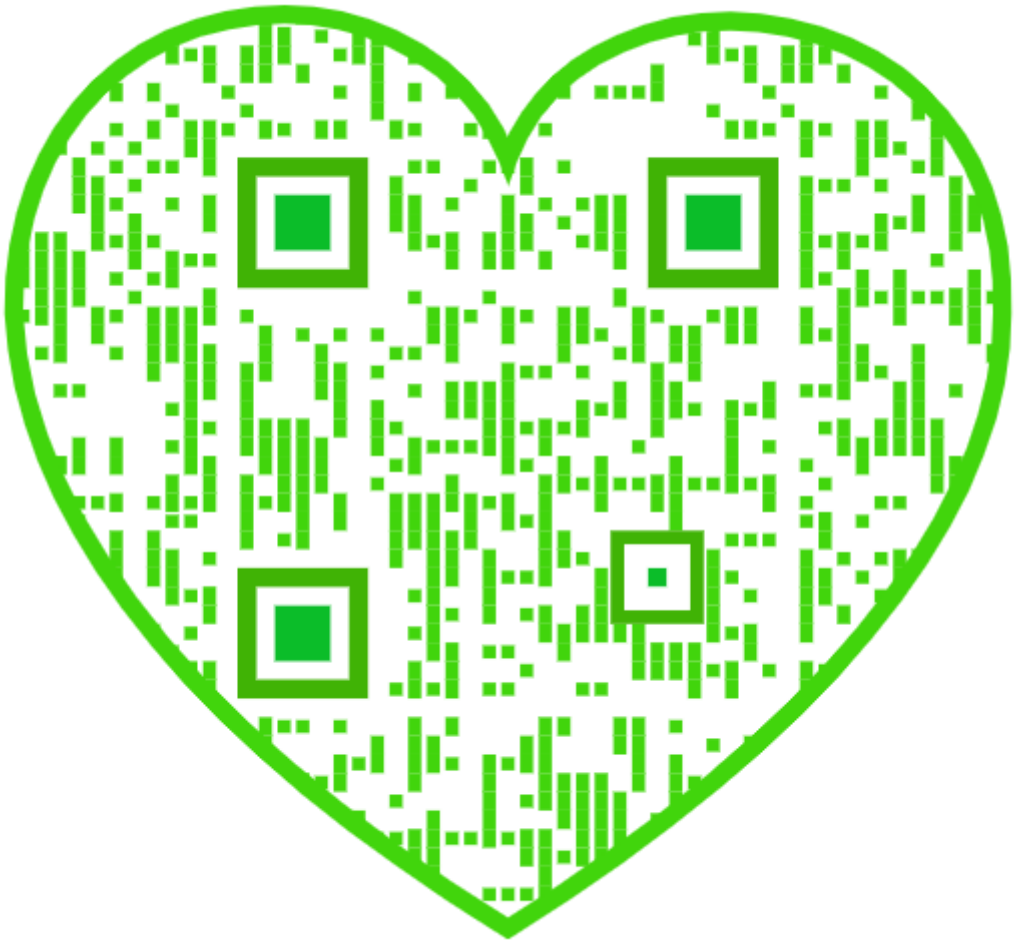

National Drawing Books

LIGHT AND SHADE

WITH CHAPTERS ON

CHARCOAL, PENCIL, AND BRUSH DRAWING

A MANUAL FOR

TEACHERS AND STUDENTS

BY

ANSON K. CROSS

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PREFACE.

THE text-books of the National Drawing Course are intended particularly for public school teachers; but this book is written, not only for public school teachers, but for all art students and others interested in art education. It supplements the first book of the series ("Free-Hand Drawing"), and shows how the methods explained in it may be applied in the study of light and shade.

Good instruction in drawing must be based upon the principles which underlie the best in art, and therefore any book which is intended for the student and elementary teacher must present these principles, and must also show how students may be led to see, think, and work independently.

The books "Free-Hand Drawing," "Mechanical Drawing," and "Color Study" form a necessary part of the National Drawing Course, as they contain the lessons in these different subjects which are to be given according to the order specified in the teacher's "Outlines of Lessons." "Light and Shade" contains no lessons or other work called for in the plan of study of the present system, for it is not considered wise to attempt light and shade in the public schools until pupils have gained more ability in free-hand drawing than they now generally acquire below the high school. In presenting, in the "Outlines of Lessons," work in outline simply, the author does not wish to be understood as in favor of this work only, or

as holding the opinion that light and shade cannot be taught in the public schools with advantage in grades below the high schools. On the contrary, he believes that this subject may under suitable conditions be properly introduced into grammar schools when pupils are able to draw in outline with some degree of facility and truth.

This book is written for those who wish to study the first principles of light and shade, and the details concerning mediums, technique, and the many points upon which the student must be informed. It is written with the hope that it may assist students, and particularly those who work at home, to study intelligently, so that all may go to Nature as the first and best teacher, and be prepared to discover in her the truths she unfolds to those who study her seriously.

Many of the illustrations of this book are from students' drawings, and though they do not reproduce the drawings perfectly, they give an idea of what may be accomplished by students who are taught to work artistically, and to depend upon themselves and upon study of nature.

Figs. 43, 44, and 58 are by second-year students of the Massachusetts Normal Art School; the other charcoal drawings of Chap. V are by students of the entering class of the same school, as is also Fig. 62. Figs. 63, 64, and 65 are by students of the School of Drawing and Painting of the Museum of Fine Arts, Boston.

Such work can seldom be done in the public schools until conditions are very different from those now existing; but teachers can give instruction of an artistic nature which will be in harmony with the work of the best artists, and which will prepare for work such as that illustrated.

Only the essentials can be given in this book. Those who wish to go more deeply into theories and principles will find many interesting books. Among these the works of Sir Joshua Reynolds are particularly valuable, as he is a prominent example of a great artist who has also written upon art, and all art students are advised to study his writings with care.

The author desires to express his obligations to Robert W. Vonnoh, G. A. Hill, and Amy Swain, who have kindly read the proof sheets and furnished him with many valuable suggestions.

ANSON K. CROSS.

BOSTON, October 12, 1896.

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LIGHT AND SHADE.

CHAPTER I.

CHIARO-OSCURA, OR LIGHT AND SHADE.

Chiaro-oscura. — The word "chiaro-oscura" means the art of producing the appearance of reality and of solidity by a drawing which represents the different lights and darks seen in nature.

Sight due to education. — We see what we have been educated to see. The infant reaches out his hand to grasp the moon, and even to adults appearances are so deceptive that when the moon is rising or the sun is setting, it is difficult often to believe that they are not just beyond some hill in the middle distance, and if the distances were not fixed by science they would be continually under discussion. There is no chance for discussion concerning the facts, but upon questions of art science is of little assistance. Hence different people viewing the same things will give very contradictory reports of what they see, and each will be positive that what he has seen is what all should see and all that can be seen.

Sight is imperfect. — Any one will be surprised to discover how little he really sees, even of the objects about him every day, if he will attempt to describe from memory, either by words or by making any kind of a drawing, the facts concerning any building which is seen daily. On comparison of his description or drawing with the building, he will be astonished to discover that he has never really seen the building, for he cannot describe correctly even its principal parts; and as for details, many of the most important he never sees until he compares the building with his description.

Sight due to memory. — The act of seeing depends upon the brain more than upon the eye, for sight sensations are referred

by the mind to knowledge previously obtained concerning similar sensations. Seeing is thus largely a matter of memory, and sight sensations are read, not by careful study of the facts of the image in the eye, but by means of the knowledge gained from all sources concerning objects which have occasioned similar sensations. The natural eye is an exact instrument which records truly the apparent form and color of an object. The same images are formed in all normal eyes which view any object from the same position, but these images will be read differently by minds differing in capacity and training; and of a dozen different people who see the same objects, no two are likely to agree in their description of them. The person who has not studied drawings looks at a circle and *sees* a circle, regardless of the position of the circle; he looks at a white object and sees white of one unvarying value; he looks at a tree and sees green when the eye may record not a single spot of green. The uncultivated eye sees objects in outline and of their local color, and even those of artistic temperament and education require much study to realize that any object of one color appears of very different colors, none of which may be the local color.

Objects are seen by contrasts of light and dark. — Objects are seen through the action of light which they reflect to the eye in different degrees and of different colors, and every object appears lighter on one side, darker on the opposite side, and throws a shadow upon some other object. Objects are visible because of contrasts of light and dark, each one appearing either lighter or darker than its surroundings, or appearing lighter than the background in one part and darker in another. If two objects of the same color reflect light equally to the eye, they appear of the same value, and if any part of one is in front of the other, its outline in this part cannot be seen.

A monochrome. — These contrasts of light, dark, and color may be represented by contrasts of light and dark, using simply one color. Such a drawing or painting is called a *monochrome*, and may be of any color, though black or some dark neutral color is generally used.

A monochrome is a light and shade drawing, whether it is made with oil or water color or colored crayon, and any drawing representing values simply is a light and shade drawing, whether made with the brush, charcoal, crayon, pen and ink, or other medium.

All objects in nature are colored, and representing these colors by black and white or by different tones of any one pigment gives a conventional treatment, which, though far superior to outline, may fail in expressing all the facts observed, to do which even color is sometimes insufficient; but a light and shade drawing is capable of expressing much concerning any object. It is more satisfactory than outline, because the shadow on any object varies with the form of the object, and thus describes it; and also because the cast shadows vary both with the form of the object which casts them and with that of the object which receives them, so that they describe the forms of both. The shadow and cast shadow will often show facts of form which the outline or contour of the object does not show at all.

Effects of different lights. — Objects are seen under very different illuminations; they may be exposed to direct light, either sunlight, moonlight, or any artificial light, and this light may be strong or weak; or they may be seen under the diffused light of a gray day, or of a room with shaded windows, or of a starlight night. The direct light may come from one source or from several, and the diffused light may be strong or weak, though to a less extent than direct light. It is evident that the effects produced by these different lights must be so numerous and so varied that to formulate rules for the production of light and shade drawings is impossible. But by study of the effects certain principles may be discovered which will help the student of light and shade just as the study of the principles of free-hand perspective aids in the study of outline drawing.

The Sphere.

Sphere illustrates all light and shade contrasts. — We will study the effects of sunlight by means of the sphere, which is well adapted to present all the light and shade effects visible in nature.

Sunlight effects. — The rays of sunlight are straight, and diverge from the sun, but in the study of shadows are generally considered as parallel. One half of the surface of the sphere will then receive direct rays of light, and the other half will receive no direct rays. The half which receives the direct rays appears light, and is called

the *light;* that which receives no direct rays appears dark in contrast with the light, and is called the *shadow.* The light and the shadow are separated by a great circle upon the sphere which is perpendicular to the rays of light. The points in the circumference of this circle are the points upon the surface of the sphere at which the rays of light are tangent to the sphere. These tangent rays form a cylindrical surface which extends below the sphere till it intersects the ground or other surface. The part of this other surface within the cylindrical surface receives no direct light and is called the *cast shadow.* Any object exposed to direct light has a light side and a shadow side, and throws a cast shadow.

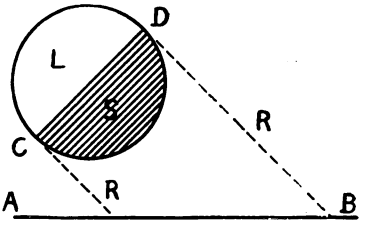


FIG. 1.

Dividing line of light and shade. — The above facts are shown by Figs. 1 and 2. Fig. 1 is a side view representing the ground by *A B*, the highest and lowest rays of light by *R* and *R*, the light by *L*, and the shadow by *S*. The great circle which separates light from shadow is represented by *C D*, and is called the *dividing line of light and shade.* Observation of a white sphere which is exposed to sunlight will make these points plain. But if Fig. 1 is not understood, let the student roll a sheet of paper into a tube which will just receive a ball or other spherical object. He will find that the cylinder will touch the sphere in a circle which is at right angles to the axis of the cylinder and which appears a straight line when the cylinder is placed as in Fig. 1.

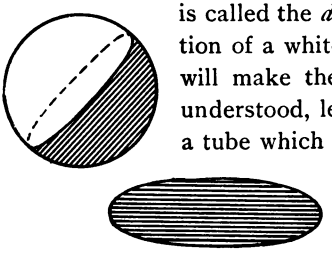


FIG. 2.

Fig. 2 represents the sphere when it is below the eye with the ellipse of cast shadow visible, and so that the circle separating light from shadow appears an ellipse.

Light and shadow on the moon. — A familiar object which illustrates the appearance of the dividing line of light and shade on the sphere is the moon, of which half the surface is lighted by the sun's rays and the other half is in shadow. The moon is constantly

changing its position with reference to the earth and the sun; hence its circle, which separates light from dark, is being seen at different angles, and the different phases of the moon result.

Photographs do not give sharp dividing lines of light and shade. — In Fig. 3, which is made from a photograph of a white sphere with a smooth surface, there is no sharp dividing line of light and shade. The light came from a window facing north, and we must now consider the cause for the difference between Figs. 2 and 3.

Reflections. — In order to determine this we must remember that

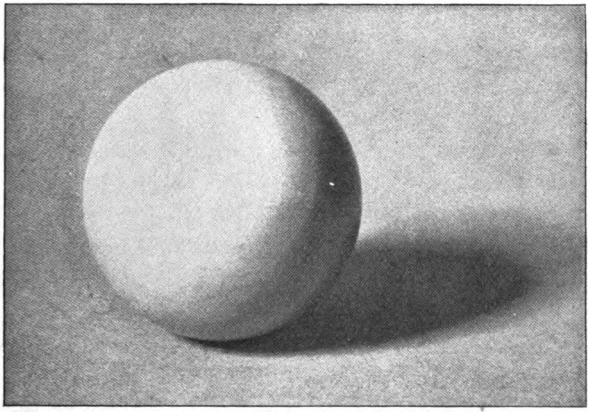


FIG. 3. From Photograph.

light is reflected from any smooth, polished surface such as that of a mirror, so that the angle of incidence is equal to the angle of reflection, and a perfect image of the object is produced. Very little of the light falling on the surface is absorbed by it, and almost all the rays are regularly reflected so that the image is almost as bright as the object. If the mirror is not quite smooth or regular, a distorted image will be produced, and as the roughness of the surface is increased, its power to reflect light decreases; moreover the light is reflected irregularly, so that no image is produced.

Effect depends upon position. — The difference in the appearance of the different parts of the sphere of Fig. 3 is caused entirely by the different positions of the various parts of its surface with reference to

the light. The lightest part is not, as is commonly stated, the part which receives the most light, that is, the part at right angles to the direction of the light, but is the part which is situated so as to reflect the light most directly to the eye. The darkest parts of the surface are those which send to the eye none of the direct rays and the fewest rays that strike the surface after being reflected from some other surface.

The high light. — The surface of the sphere is continually changing. One point is situated so that it reflects the ray which it receives directly to the eye. This point glitters, and is called the *high light* or *glitter point.* Away from this point the rays are reflected less directly toward the eye, and the farther from the high light a point in the light is situated, the farther from the eye it reflects the light it receives.

The high light is theoretically a point when seen with one eye and with direct sunlight, and if the sphere is one whose surface is a perfect mirror. With any studio or other light and the usual conditions, the high light is a figure of definite form, which is the reflection of the window or source of light, and within it will be found the image of all the bars which divide the window. If the sphere is not polished, there will be instead of the high light a spot whose size depends upon the size of the window or light, and which is brighter than any other part of the sphere. Hence we have a glitter point or its equivalent on the surface of every sphere.

The half light. — The points in the circle which separate light from shadow do not reflect any direct rays to the eye, for these rays are tangent to the sphere at these points, which, since they receive no direct light, must appear very dark. From the high light toward these points there is a gradual diminution in the apparent brightness of the sphere, and at these points the light surface ceases. The gradation is very gradual through the larger part of the light, and is most noticeable near the dividing line of light and shade; this last part is called the *half light.*

The reflected light. — The strongest part of the shadow upon the sphere is the circle which separates the light from the shadow. Between this circle and the outline of the sphere a part of the shadow is considerably lighter than the rest of the shadow. This is caused

by light which is reflected to the sphere from the object on which it rests or from other objects, and is called *reflected light.* This reflected light is always present, and the entire shadow part of the sphere which is visible must receive and send to the eye some reflected light; were this not the case all details of the shadow side would be as invisible as the dark part of the moon. The power of reflected light is shown at the time of new moon when all the surface of the moon is visible; a small part being brightly illumined by the direct rays of the sun, and the larger part faintly lighted by the rays reflected to it from the earth and then sent back to earth again.

If the surface of the sphere is polished and a bright object is placed near the shadow side, it will be reflected bright and sharply defined; and upon a sphere of polished metal the reflections would be so bright as to destroy the effect of light and shadow. When the surface is not polished or not even smooth, the reflected lights are much weaker and may often be hardly noticed.

The cast shadow. — The cast shadow in Fig. 3 is seen to be dark and clearly defined, its outline being sharper near the sphere than farther away. The cast shadow, like the shadow, is darker in parts and lighter in other parts, owing to the unequal amounts of reflected light which these parts receive and then reflect to the eye.

Photographs not always true to nature. — Photographs do not give the values and relations which the eye sees, but they often give the principal effects so nearly as the eye sees them that the student may learn much from them in connection with study of the objects themselves, and thus many of the illustrations of this book are from photographs. All who study these notes are advised to carefully study similar objects placed so that they are lighted as in the illustrations. The direction of the light and the size of the window from which it comes influence the effect so strongly that several experiments may be necessary to obtain effects similar to those of the figures.

The Cube.

Generally three faces of the cube are in light and three in shadow, and six edges separate light from shadow and form the dividing line of light and shade.

Fig. 4 represents a white cube placed against a gray background and a piece of charcoal resting against the cube. The light comes from above, behind, and at the left of the spectator.

The light. — The front light face is lightest at the front edge and gradually becomes darker as it recedes; it is lighter than the top face. If the cube is perfectly clean and its faces are equally white, and the light comes from such a direction that the top face and the front face reflect it equally to the eye, these faces will appear equally

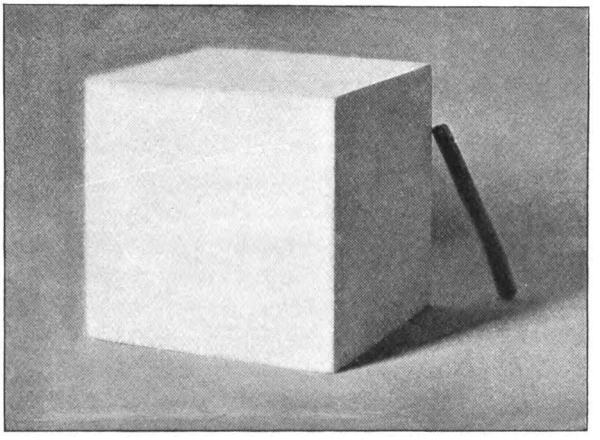


FIG. 4. From Photograph.

light, and the edge separating them will be invisible. If the top face reflects more light to the eye than the front face, it will appear the lighter.

The shadow. — The shadow side of the cube is darker than the foreground and background, lighter than the cast shadow, and much lighter than the charcoal; it is darkest at the front edge and gradually becomes lighter as it recedes. It is also darker near the bottom where the dark cast shadow reflects dark.

The cast shadow. — The cast shadow is darkest and sharpest nearest the cube. The charcoal seems to cast a shadow within that of the cube; but as the charcoal is wholly within the shadow of the cube and receives no direct rays, it is evident that the darkening of

the cast shadow near the charcoal cannot be due to the same cause that occasions the cast shadow of the cube. No object which is in the shadow of another can cast a direct shadow, for it receives no direct rays of light. It does, however, receive indirect rays, and when they are strong an object in the cast shadow, like the charcoal in the present case, may cut off these reflected rays so as to darken the cast shadow near the object, and thus practically produce the effect of a cast shadow. The cast shadow of the cube is darkened in this way in two distinct directions, and variety in the cast shadow is often due to this cause.

Light reflects on foreground. — The front face of the cube reflects light to the foreground. If the foreground were smooth, this light would cause a distinct reflection bounded by two vertical lines; but as the foreground is rough paper, the reflections of the edges of the face are not seen, and the foreground is simply lightened under and near the face.

THE CYLINDER.

The light and the shadow. — Half the curved surface of the cylinder (Fig. 5) is light and half is shadow, one base is light and the other is shadow, and two opposite elements of the cylinder separate the light part of the curved surface from the shadow.

As the direction of the light changes, the shadow elements change so that the visible curved surface may be wholly light or wholly shadow, or both light and shadow in any proportion.

The high light. — If the cylinder is polished and both the light and shadow of its curved surface are seen, the light, if sunlight, will strike upon the curved surface along some one element so as to be reflected directly to the eye, and thus give, instead of a glitter point, a glitter line or element.[1] If the light is that of a studio, it will be reflected to the eye from a number of elements, and thus give a band of light parallel to the axis of the cylinder. The width of this band of glitter light depends upon the width of the window. From this high light the curved surface curves in each direction so that the farther

[1] As we have two eyes, there are really two glitter-points upon the sphere and two glitter elements upon the cylinder and cone, but they are near each other.

it is from the high light, the farther from the eye it reflects the light which it receives; and finally we reach the shadow elements, which separate the light from the shadow. The rays of sunlight are tangent to the surface in these elements which, receiving no direct light, appear very dark; toward the high light from these elements we have with sunlight a broad and simple mass of light, marked by the glitter

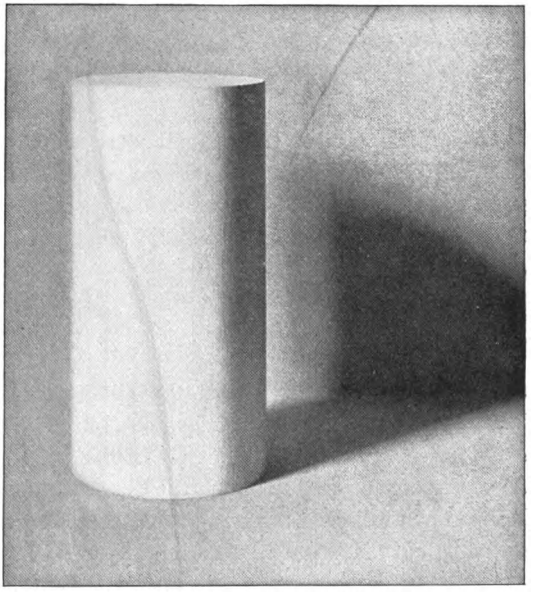


FIG. 5. From Photograph.

elements and by the half light which gives the gradation into the shadow and which is most marked near the shadow elements.

Gradation in the light. — With a studio light the gradation from light to dark is more gradual, and from the high light we find a gradually increasing tone which increases in strength near the shadow element and gradually becomes shadow. We find also in any light, gradation from the glitter element in opposite directions, so that at the contour element in the light the tone is darker than at any element between the contour and the glitter element. The

drawing imperfectly represents this gradation in which there is no sudden change from one element to the next.

The base in light will generally appear darkest where it comes in contrast with the lightest part of the curved surface.

Gradation in the shadow. — The shadow element receives no direct light, and generally it receives less reflected light than the other elements in the shadow, so that the shadow is generally darkest at the shadow elements. The contour element on the shadow side is generally decidedly lighter than the shadow element, and between these elements the shadow is generally affected by reflected lights so that its lightest part is between the contour and the shadow element.

The cast shadow. — In Fig. 5 the cast shadow is darker upon the vertical than upon the horizontal surface, although it may be the other way when the light comes from another direction. Though not shown by the photograph, a small part of the cast shadow nearest the cylinder was the darkest part of the cast shadow. The contour of the cast shadow is composed of straight lines, which are the shadows of the two shadow elements of the cylinder, and of a curve which is the shadow of half the circular edge of the upper base.

Shadows soften as they recede from the object. — The softening of the shadow, as it recedes from the object which casts it, is due in all the figures to the fact that the light comes from a window several feet in width. From each side of this window the rays pass tangent to the object so that they cross each other and produce a series of shadows overlapping each other, and which increase gradually the strength of the shadow until its full depth is found beyond the boundary of the surface from which the cylinder cuts off part but not all the rays which enter the window. Near the object this partial or soft shadow covers very little space, and at the object practically none, so that the cast shadow where it begins is very keen and becomes softer as it recedes, until often with a studio light it may not express the form of the object that causes it.

The Cone.

The light and the shadow. — When the cone is directed toward the light, all its curved surface is light and the base is shadow; when directed from the light, the base is light and the curved surface is wholly shadow. The curved surface may be both light and shadow in any proportion. The light and shadow are separated by elements; but though they may be opposite elements, as in the cylinder, the proportion of light to shadow would seldom be the same.

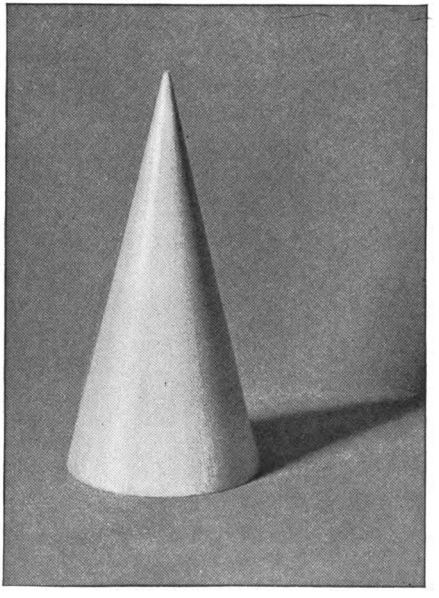


Fig. 6. From Photograph.

The high light and the light. — When the curved surface of the cone (Fig. 6) is partially or wholly in light, one element will reflect the light directly to the eye and be the glitter or high light. From this high light the curved surface extends in both directions towards the shadow elements, which reflect no direct light to the eye and which are the darkest elements. The nearer any element in the light is to the shadow element, the farther from the eye it reflects the light, and so, as in the case of the cylinder, there is a perfect gradation of tone from the high light to the deep shadow of the shadow elements. The change is gradual and most marked near the shadow elements in the half lights, so that as we go from the shadow elements toward the glitter element the effect is that of a mass of light.

The shadow. — The shadow element generally reflects to the eye less reflected light than the other elements in the shadow, and the darkest shadow upon the cone is generally at the shadow element.

From the shadow element toward the contour element on the shadow side there is gradation due to the reflected light, which is strongest between the contour and shadow elements. The contour element is usually lighter than the shadow element.

When the visible curved surface is wholly or largely shadow, the darkest shadow is generally on the nearer parts, and the same is true of the cylinder when thus placed.

The cast shadow. — The cast shadow in Fig. 6 is bounded by straight lines which are the shadows of the shadow elements, and, as in the other figures, it is sharpest and darkest nearest the cone.

Effects are accented at the vertex. — The light and dark are concentrated at the vertex of the cone and pyramid and are thus accented, so that the shadow on the cone is darkest and the light lightest nearest the vertex.

Gradation in all parts. — Fig. 6 does not perfectly illustrate the effect, which should be that of a gradually increasing tone from the glitter element to the shadow element, and the same in the other direction, so that the tone at the contour element at the left should be darker than that upon any element between the contour and glitter elements.

The Pyramid.

A square pyramid is represented in Fig. 14 with other objects, but will serve to illustrate the remarks upon solids of this type.

The light and the shadow. — If the apex is directed toward the light, all the lateral faces will be light and the base shadow; if the apex is directed from the light, all the lateral faces will be shadow and the base will be light. Generally some of the faces are in light and others in shadow, and there is gradation and variation in all.

The lightest face. — The lightest face is that which reflects the light most directly toward the eye, and it is lightest nearest the eye where it contrasts with the adjoining face.

The darkest face. — The darkest face is the one which sends the least light to the eye; it appears darkest along the lateral edge which is nearest the eye, and which separates it from the adjoining lighter face.

Gradation due to perspective and to contrast. — These effects are due to the fact that a dark surface appears lighter as it recedes, and a light surface appears darker, and also to the fact that contrasts of light and dark, or of any two different tones, increase their difference where they juxtapose by causing the dark to appear darker and the light to appear lighter.

Slight differences in value to be represented. — In Fig. 14 the base and the light lateral face appear to have the same value. In nature the base was slightly darker than the face; this difference should be expressed in any light and shade drawing after the effect of the masses which the illustration gives has been represented.

Objects of Different Colors.

A colored object has light and shadow upon it. — The solids represented have all been of uniform white color, and the different lights and darks have been due solely to the effect of light and shade.

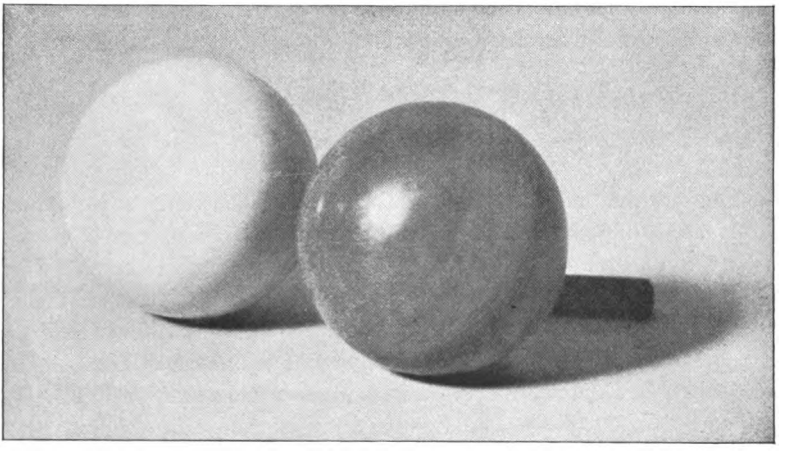


Fig. 7. From Photograph.

Fig. 7 represents two spheres, one white and the other red, and illustrates the fact that there is light and shade upon a dark object just as there is upon a white one. The difference between the light and dark is not as great upon the red sphere as upon the white, but

there is the contrast of the same masses of light and dark, and in each mass there are the same gradations as in the corresponding mass upon the white sphere. The red sphere, however, appears lighter at the left part of its contour than nearer the high light. This is due to the fact that the sphere was highly polished, and reflected so much light from the surrounding objects that the effect of the principal light from the window was destroyed by the strong reflections.

The shadows differ in values. — A piece of charcoal is seen in the shadow of the red sphere. It appears much darker than the sphere, and illustrates the fact which students always fail to realize, — that color always shows through the shadows so that *the shadows upon objects of different colors and luminosity are always of different values.*

Cast shadows reflect dark. — The cast shadows are much sharper and darker near the spheres than farther away, and they reflect upon the spheres so as to darken the parts near the contours.

The high light prominent in a dark object. — The high light is much more noticeable upon the red sphere than upon the white one, for the spheres are polished, and though the red one does not reflect as much light as the white one, its high light in contrast with the dark red color seems more prominent than that of the white sphere, in contrast with white.

A dark color may appear lighter than a light color. — The figure illustrates these principles, but does not give all the relations truly. It is the first to show the most important effect of light and shade upon colors which is to make *the light of a dark color often appear lighter than the shadow of a light color.*

The Same Subject under Different Lights.

The illustrations studied have represented the effects due to a studio, the light coming from the left and from above and behind the spectator. We will now compare the effects produced upon the same objects by lights from different directions and of different kinds and strengths.

A North Studio Light.

Light at the side. — Fig. 8 represents a group of white drawing models placed in a studio upon a shelf and against a background covered with dark gray cartridge paper, the light coming from above at the left and slightly behind the spectator. The effects of light

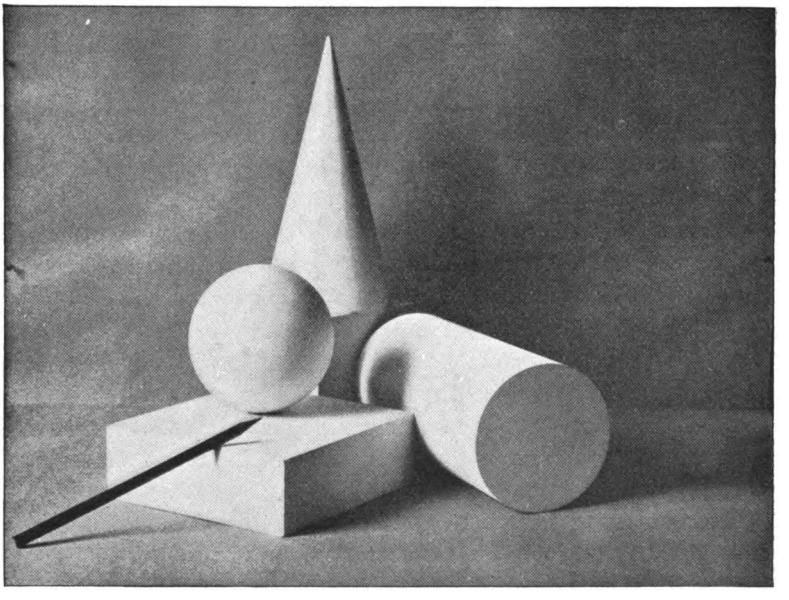


Fig. 8. From Photograph.

and shade upon the different objects are such as have been described, but owing to the imperfections of the photograph and its reproduction, the gradations in the masses of light upon the different objects are not well expressed. Thus the left-hand contour of the cone should be darker than any element between it and the glitter element. This element does not appear, but should be about as far from the left contour as the shadow element is from the right contour; and the shade upon the sphere should gradually increase in strength from the high light toward the contour in all directions; and that upon the

cylinder should increase from the lightest element, which is about midway between the contour elements, toward the contour elements in both directions. The figure does not show that one of the lights of the group is lighter than all the others, and one of the darks is darker than all others, but it does give the effect of the principal masses of light and dark which it should be the first aim of the student to obtain.

Cast shadows show forms of objects. — The cast shadows of the plinth, the sphere, and the cube upon the cylinder show the form of the cylinder and also the forms of the different objects casting the shadows. The shadow of the pencil upon the vertical side of the plinth extends very faintly towards the shadow of the pencil upon the foreground, for the rays of light causing the shadow cross each other as explained on page 11, so that the shadow is dark only very near the pencil.

Narrow shadows must be represented. — The plinth does not rest evenly upon the shelf, so that we see under it slightly at the central part of the light side, and a narrow shadow is produced. This shadow is lightened by diffused light from the strong light rays sent to the eye from the surrounding parts, but it is an important detail and should be represented; and the advice which is given on page 99 to avoid outlines does not refer to such a place as this where the effect of an outline is given by a narrow shadow or by a narrow edge which catches the light.

Studio lights give soft shadows. — The cast shadow of the cone on the background illustrates the fact that with a studio light the crossing rays from a large window so soften the shadows that often they do not suggest the forms of the objects which cast them.

Foreground lighter than background. — The mass of the light of the foreground is lighter than that of the background, and illustrates the usual effect of the values when foreground and background are of the same material and color. The foreground is lighter because it generally reflects more light to the eye, and also because it collects in a short time dust which lightens its effect, unless the foreground is very light. The value due to dust should be represented, as it can hardly be kept away from a subject to be studied several times.

Sunlight at the Side.

Fig. 9 represents the same group when exposed to the direct rays of the sun from a direction about the same as that of the light in Fig. 8.

Effects are light. — The first point to be noticed is that the effect is much lighter than that of Fig. 8. This is due to the fact that out-

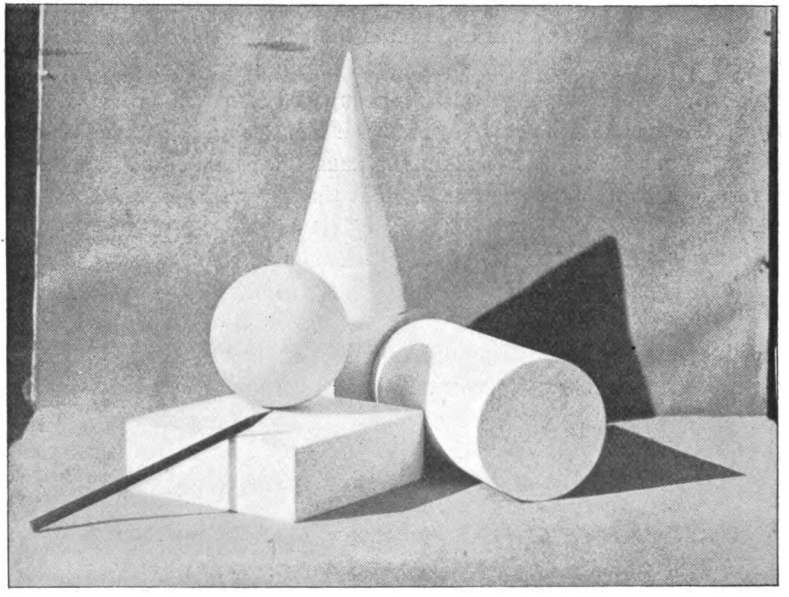


Fig. 9. From Photograph.

doors there are strong reflected lights coming from all directions which lighten all shadows and cast shadows to a great extent.

Cast shadows are sharp. — Next we notice that the cast shadows are as sharp and distinct as the edges of the objects. This is always the case when the cast shadows are near the objects that cast them. On the other hand, the greater the distance between any edge and its shadow, the softer is the contour of the shadow, because the rays of sunlight are not quite parallel, and thus soften the cast shadows which are distant, as explained on page 11.

Gradation in shadows and cast shadows. — The cast shadows are sharp in outline and more nearly of one value than in Fig. 8, but there is gradation in them and also in the shadows. Thus the cast shadow of the plinth upon the cylinder reflects dark upon the shadow side of the plinth and upon the cast shadow of the plinth on the foreground. The shadow side of the plinth has nearly the same value as the foreground, instead of being darker as in Fig. 8.

Directions of cast shadows. — The cast shadow of the pencil is a continuous band which runs along the shelf, then up on the vertical side of the plinth, and then along upon the top of the plinth, where its direction is the same as upon the shelf, for *when the shadow of any line falls upon parallel surfaces the shadow has the same direction on each surface.*

The cast shadow of the pencil upon the shelf and of the cone upon the background are curved by the uneven surface of the paper.

A Studio Light behind the Spectator.

Effect is a mass of light. — Fig. 10 represents the same group placed in a studio and lighted by a window directly behind the spectator. This light causes the visible surfaces of the objects to be light surfaces and the effect of the whole group to be that of a mass of light, for the cast shadows are behind the group and are largely invisible. The objects are distinguished from each other by slight differences in value, and the gradations of tone upon any one are very delicate. The cone, cylinder, and sphere each have a glitter point or line. These lights are upon the nearest parts of all the solids, and from them there is a tone which gradually increases in strength towards the contours. The plinth also has a part which is lighter than any other part of its surface; but high lights are seldom found upon polyhedrons, even when their surfaces are polished, for in order to glitter a plane surface must as a whole reflect the light directly towards the eye.

Little contrast of light with shadow. — The visible cast shadows are small in Fig. 10, and are always small when the light is behind the spectator, unless they are cast by parts which overhang and cause cast shadows to fall upon the visible light surfaces. There is

also seldom the contrast of a light surface with a shadow surface, and therefore in general very little contrast of light and dark.

Effects too difficult for students. — This position of the light is not suitable for students. It requires the ability of an artist to represent solidity and atmosphere by the delicate gradations given

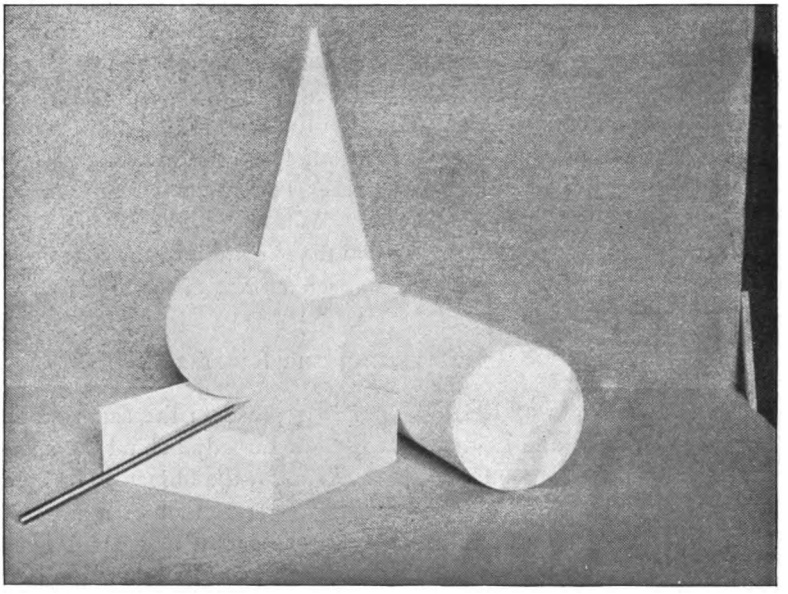


FIG. 10. From Photograph.

by a light behind the artist, no matter whether the light be that of a studio, sunlight, or any other light.

Contrasts are largely due to color. — The principal contrasts of light and dark with this light are generally due more to contrasts of local color than to contrasts of light and shade.

The processes employed to make the illustrations do not give the fine contrasts of the light, the glitter light, and the more delicate gradations which the student must observe by study of nature. In this case the pencil is the only dark object in the group and the only one which shows the glitter light.

Objects reflect strongly in the foreground. — The reflected light from the end of the cylinder to the foreground is so strong that even on

the rough paper it gives a clear reflection of the edge of the cylinder. The cast shadow of the camera fell upon the foreground and darkened it; were it not for this shadow, the nearest part of the foreground would be the lightest.

A Studio Light in Front of the Spectator.

Effect largely shadow. — Fig. 11 represents the group when placed in front of a studio window. This position causes the visible surfaces to be largely shadow surfaces.

The light strikes, however, the top parts of the cube, the cylinder, the sphere, and the plinth, and these surfaces are light; but in out-

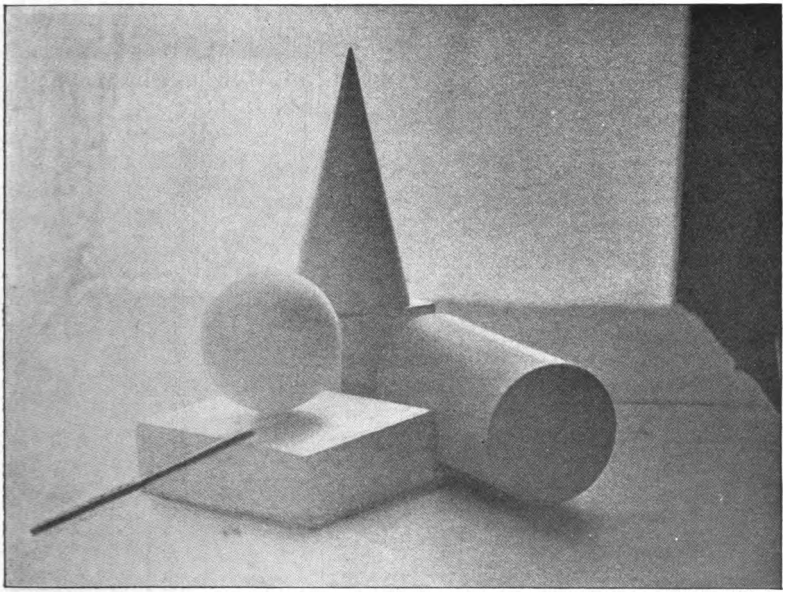


Fig. 11. From Photograph.

door subjects the upper surfaces of objects are generally invisible, and there is less light than in Fig. 11.

The cast shadows are dark and prominent in the effect, as they are wholly visible and extend toward the spectator. Fig. 11, in con-

trast with Fig. 10, presents a mass of dark which is the general effect indoors or outdoors when the light is behind the objects; it also shows that the shadow surfaces with the cast shadows form the larger part of the subject.

Strongest shadows on the nearest parts. — The increase in the strength of the shadow upon the cone towards its vertex is well shown, and also the fact that the strongest darks are generally on the parts nearest the eye.

Strongest lights on the contours. — The strongest lights are on or near the contours of the objects. On the pencil the glitter light is at the contour, and makes the black pencil lighter than the light parts behind it.

Diffused Studio Light.

Fig. 12 represents the same group when it is lighted by weak diffused light coming from both sides and from behind the spectator,

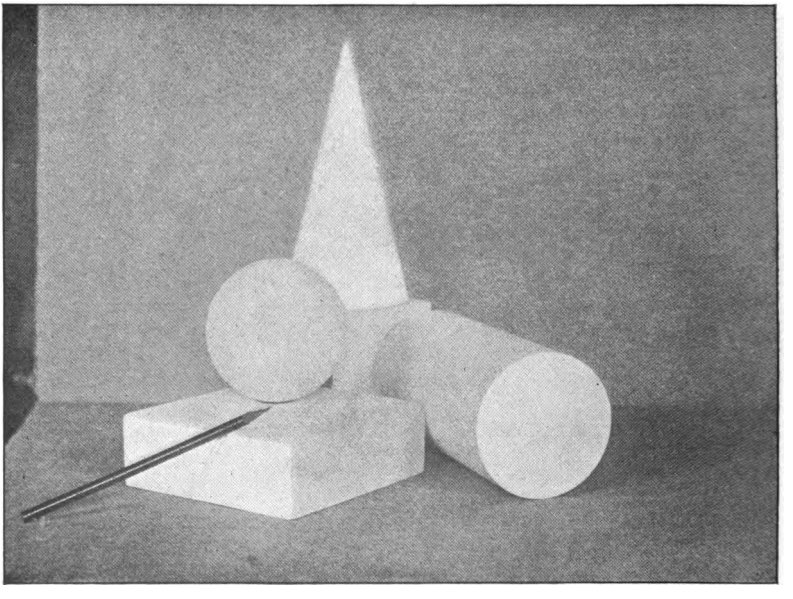


Fig. 12. From Photograph.

and producing about the same effect as would be obtained in a room having several windows whose curtains are drawn.

Delicate light and shade contrasts. — We find there are several faint, soft shadows and no strong contrasts. In this respect the effect is similar to that of Fig. 10, but very much darker, — a fact not well shown by the figure.

Dark objects may have strong lights. — The glitter light upon the pencil is prominent, and well illustrates the fact that even the darkest objects whose surfaces are polished may have upon them the strongest lights of the group.

Artificial Light at the Side.

Fig. 13 represents the same group when exposed to the rays of a very powerful lamp placed near the group.

Strong contrasts of light and shade. — The effect is due to the contrast of strong lights and deep shadows, and at first glance we

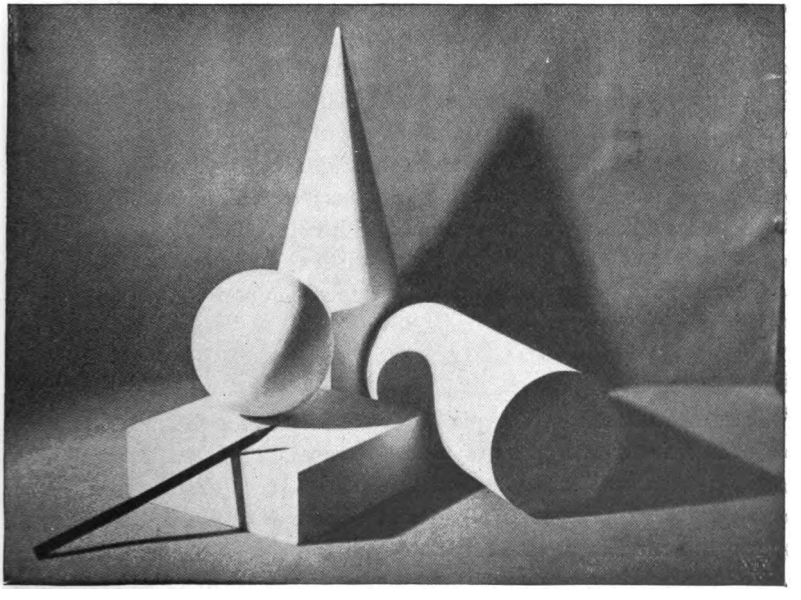


Fig. 13. From Photograph.

feel the simplicity of the masses of light and shadow. Fig. 13 makes these masses more simple than they really were, for it does not give the delicate gradations. The light and dark upon the cone, for instance, would, except near its base, represent a pyramid ; for there is so little gradation near the shadow element that the idea of roundness is not well expressed. Upon the sphere the circle (ellipse) that separates light from shadow is also very sharp.

Sharp and dark shadows. — Sharpness is, however, a distinguishing feature of the shadows of objects that are exposed to one strong artificial light, and the stronger the light, the greater the contrast between the masses of light and shadow, and the less the gradation from one to the other upon rounded objects. There is, of course, gradation upon rounded objects, but it is very delicate through all the mass of the light, and is principally confined to a very small space near the shadow element.

Masses of dark very simple. — Another effect characteristic of a single artificial light is the strength and simplicity of the masses of shadow formed by the shadows and cast shadows. The base of the cylinder and the cast shadow of the cylinder illustrate a common effect, namely, that in which the shadow and cast shadow adjoining are nearly of the same value. The shadow side of the cube illustrates another effect, that in which the shadow and cast shadow are of the same, or so nearly the same, value that the contour of the object is lost in the mass of shadow. The student who works with light and dark or with color should be careful not to represent contours which cannot be seen, for much of the interest and artistic effect of the drawing depends upon its being true to nature in this respect.

MOONLIGHT.

Simple masses. — The given illustrations cover the most common effects with the exception of those due to moonlight. Moonlight is simply weakened sunlight, and produces effects similar to those of sunlight in respect to the contrast of simple masses of light and dark and the sharpness of the cast shadows. The principal masses of light and dark are much more prominent than by sunlight, and few details are seen in the masses. The masses of dark are espe-

cially simple, for reflected lights are very weak, and often not noticeable.

Moonlight gives an interest to nature which should lead the art student to realize the beauty of simplicity and the charm of mystery. By moonlight the most common and familiar subject often possesses a beauty which is not felt at all when all the details of the subject are brought out by daylight; and the student will do well to compare the daylight and moonlight effects upon the same subject, for in this way he will discover the beauty of the contrasts of simple masses and important lines, which are often not felt in the stronger light.

Light from Several Sources.

Shown by cast shadows principally. — The effects due to the light of a room and to artificial light may be, and generally are, greatly varied by the crossing of light from several sources. The principal effect of several lights is seen in the cast shadows, where the cast shadow due to any light may be followed just as if it were the only cast shadow. Any one cast shadow is darkened where a second shadow falls upon it; but the contour of the second may be seen as distinctly as that of the first, and any number of cast shadows caused by different lights may be clearly seen, the strongest part of the cast shadow being the part which receives the greatest number of different cast shadows, and being central and nearest the object.

Light and Shade Effects upon Objects of Different Colors.

Having compared the principal effects of light and shade, and also those due to different lights upon the same subject, we will study in detail the effects of light and shade upon objects of different colors, beginning with the high light and ending with the cast shadow.

The High Light.

Is influenced by smoothness of surface. — The strength of the high light depends upon that of the illuminating light, and upon the smoothness of the surface which reflects it; the smoother the sur-

face the brighter the high light, and the more perfectly it reflects the color of the illuminating light. A polished metal vase or any glazed object will give a perfect image of the source of the light. In a studio, for instance, it will reflect the window with its cross-bars, and the color of the high light will be that of the sky or whatever else sends the light through the window to the object.

Is colored. — Pupils are generally so deceived by the brightness

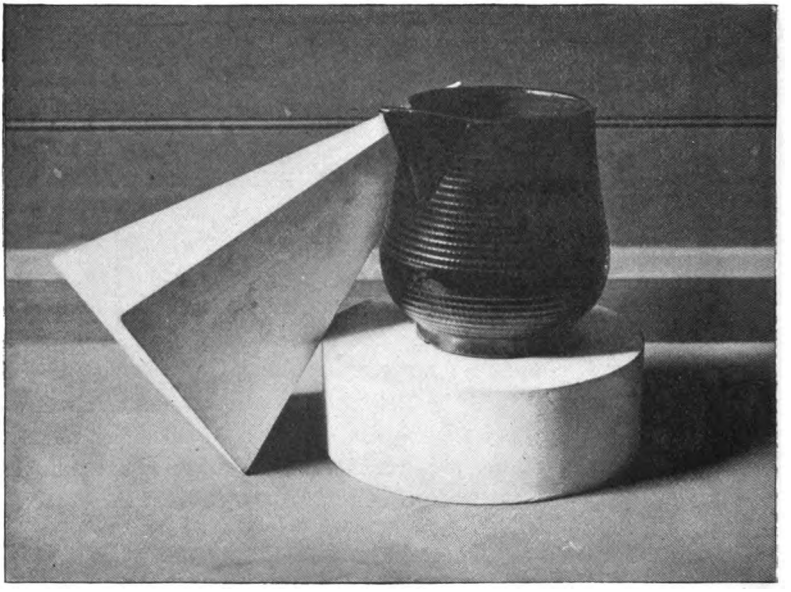


FIG. 14. From Photograph.

of high lights, especially those on dark glazed objects, that they fail to see any color in them, and represent them by pure white, even when they have a white object in the group. They should remember that such lights always reflect the color of the light causing them, and are darkened by the color of the object on which the light falls. If they will try the experiment of blurring the form out of any high light by holding the blur glass as far from them as possible, still obtaining in it the image of the high light, they will readily see the color blue in case the object reflects the blue sky. This experi-

ment shows that the high light upon a glazed object may be darker than that upon a white object, even if unglazed.

Varies upon different colors. — Every object reflects directly some white light. The remainder of the white light enters the

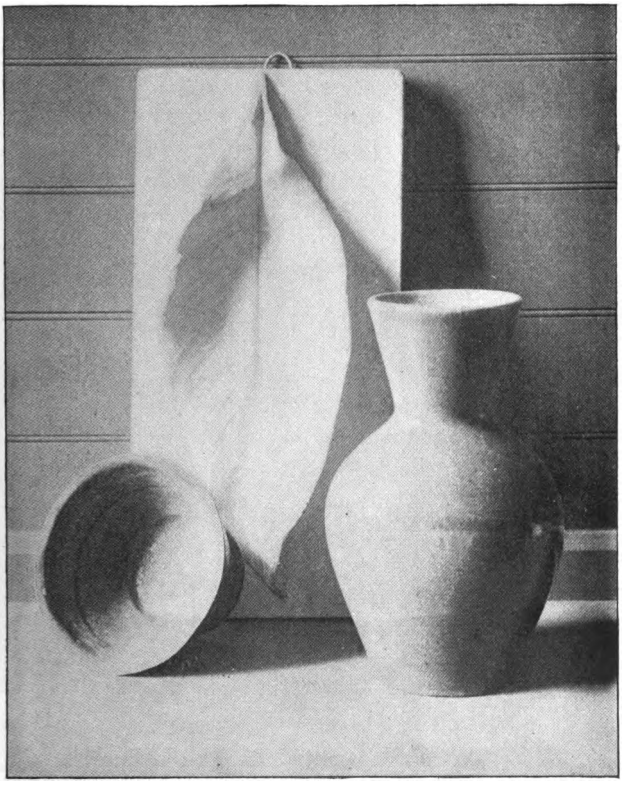


FIG. 15. From Photograph.

object a little distance where some is absorbed, and the remainder is turned back and reflected in all directions, the reflected rays having the same color as the object. Now a dark object reflects less of the light which enters its surface than a light object, and hence the high lights upon polished objects of different colors are not equally light when the surfaces are equally smooth. By contrast the high

light upon a dark glazed object may appear lighter than that upon a light and equally glazed object, but it is really not as light.

Generally a colored object is not a smooth and perfect mirror, and the color of the object is felt quite strongly through the high lights. For this reason the reflected color is often darkened so that the high light on the glazed blue vase, for instance, in Fig. 15, is not as light as the light upon the white cast, which is quite rough in comparison with the vase. The rougher the objects, the more light they absorb, and the more irregularly they reflect what is not absorbed; and in place of high lights there will be on unpolished objects, such, for instance, as common plaster casts, lights which gradually grade into the delicate shades that are seen in the mass of the light.

Local color not seen in high light. — The local colors of objects are not seen in the high lights, even when the objects are not polished; for when the high lights do not reflect the color of the light, they are so heightened by the strong light they receive that they do not give the effect of the local color of the object; and as a matter of fact the high lights upon the human face are often cool and even bluish in tone.

Generally caused by rounded surfaces. — Glazed objects which are round or bounded by curved surfaces will generally have high lights in any position of the spectator. A plane surface which glitters throughout must be very small. When an object bounded by plane surfaces is so placed that one surface glitters, the slightest change in the position of the eye may entirely change the effect; for a surface which glitters with the eye in one position will not glitter if the eye is moved a short distance, and instead of appearing the highest light, it may appear dark if its local color is dark.

Varied in form. — The form of the glitter light is dependent upon that of the window or other source of light, and also upon that of the object. Upon a curved surface straight lines generally reflect as curved, and upon a plane surface they reflect as straight.

Iridescent color. — The most beautiful color effects are found in the high lights upon iridescent objects, and the study of these lights will assist the student to realize how changeable are the colors and the values of the same object.

Must be carefully drawn. — The effect of a glazed object can be given only by carefully drawing the high lights upon it, and they must be represented with decision,[1] for when gradually softened into the mass of light, the effect of an unglazed object is given.

Found upon every rounded part. — A high light is found upon every polished surface whose position is such that it reflects the

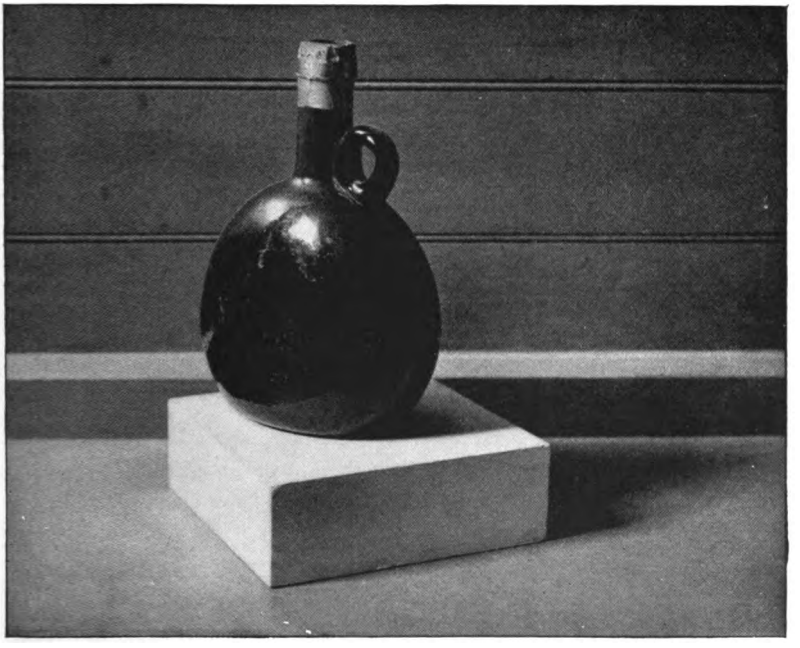


FIG. 16. From Photograph.

light directly into the eyes. In Fig. 16 there are two lights upon the body of the bottle, because there were two divisions in the window from which the light came. Fig. 14 shows how high lights are found upon the edges of objects, and upon all ridges or mouldings. Figs. 15, 17, and 18 show that these high lights are found in relatively the same position upon the different curved parts of the same object, so that they may be said to exist on a single element

[1] See page 99.

of the surface. In the cone and cylinder the element is straight, but in the bottle or vase the corresponding line or element is curved, and may be regarded as the outline of a section of the object made by a plane passing through the axis; it is foreshortened so that, in Fig. 18, for instance, if the light were directly behind the spectator, the different high lights upon the vase would come in one vertical line, — the center line of the vase.

The Light.

The effect of the light upon the principal geometric solids has been studied, and it has been shown that without regard to the color, any object has a light side and a shadow side, and that there is light and shade upon even the blackest object.

Strongest on the lightest object. — When objects are of different colors, the lightest color will reflect the most light, and the light side of a white object will be lighter than the light side of a yellow object which has the same position; and if the positions of all the objects with respect to the light are the same, the light of the yellow is lighter than that of an orange object; that of the orange is lighter than green, the green than red, the red than blue, the blue than violet, and the violet is lighter than black.[1] It is well for students to understand this fact, but they must remember that they cannot apply the principle instead of observation of nature; for the different colors in nature will not be placed so they receive equal amounts of light, and consequently any color, as orange, or even a darker color, may receive so much light as to appear lighter than yellow or even white, which may happen to be so placed that it reflects less light to the eyes than the darker color.

Photographs of colors not true in values. — Photographs do not give the values of colors; thus photographs of yellow are much too dark and those of blue are too light. The yellow bottle in Fig. 20 seems almost as dark as the upright vase, which was green, and darker than the bottle; and the vase in Fig. 15 seems quite light, while the object was dark blue. But the photographs which are reproduced bring out the most important fact regarding the mass of the light of

[1] The colors are supposed to be the six standard spectrum colors.

any object; for they all show how simple it is, and artistically they are much more satisfactory than they would be if they gave all the detail the eye could see, but at the expense of the loss of the broad mass of light.

The student exaggerates detail in the light. — The entire leaf in Fig. 15 is covered with veins which the light side of the leaf hardly suggests. In attempting to represent these veins the student is almost certain to exaggerate their strength so that the effect of this half of the leaf is that of a mass of gray, or more often of a series of bands of light and dark alternating. The student exaggerates because contrast effects make detail seem stronger than it really is, and also because the eye sees only a small part at one time, and that part with the amount of light which the eye receives adjusted so as to bring out all details of this part. Thus if we go from the sunlight into a darkened room, we see at first none of the objects in the room, but gradually the pupil of the eye expands to admit more light; and if the room is not too dark, the objects appear one after another, until the eye is fully adjusted to the light and all objects are seen. If now we go into the sunlight, we are blinded by the light, and the light sides of objects seem a blaze of light with no detail, until the pupil closes and shuts out most of the light. When this has happened, a surface which seemed one uniform glaring light is seen to be covered with detail.

The value of any part seen only by comparison. — It is evident that the true effect of any object cannot be seen if the student fixes his eye upon either its mass of light or its mass of dark, for his eye will adjust to the light or the shadow, as the case may be, so that no detail is seen except in the part studied; thus the detail is not seen in its proper relations to the whole, and detail can only be seen in its real relations as explained in Chap. II. The aim of the serious art student in looking at detail should be to study its form and determine its value by looking, not at the detail alone or the parts about it, but rather at all of them at once.

Causes dark color to appear lighter than light color. — The most important effect of the light is to lighten all that it strikes upon, so that a dark color appears lighter than a light color which receives or reflects less light. This is shown by the red sphere of

Fig. 7 and the blue vase of Fig. 15, which, though too light in the light, is still true to the fact that in nature the dark blue appeared very much lighter than the cast shadow upon the cast. In Fig. 16 the contour of the black bottle appears lighter than the gray background. In Fig. 18 the green vase is lighter than the gray cast, and in Fig. 20 the green vase is in some parts of the light lighter than the background, in other parts of the same value, and in some places the light is darker than the background.

Lightens and destroys detail. — Another effect which is difficult for the student to see is that the light often partially or wholly hides detail which is known to exist. Thus in Fig. 15, on the left-hand part of the leaf, we find between the outer edge and the midrib representations of veins which extend continuously, but which are seen only at their central parts. Similar effects are found in Fig. 18, and these figures illustrate the common case in which continuous detail in the object is situated so as to receive the light at different angles, and be visible for part of its length only. The student who sees the central part of a detail whose form he knows, is very apt to think he sees it all, and represents its entire length; he is especially apt to draw the whole when he sees the two ends of a detail whose central part cannot be seen, and he must be very careful to draw no more than he sees, for without the careful observation which notes every place in which the light obliterates the detail, an artistic drawing cannot be made.

Lightens small shadows and cast shadows within it. — Not only does the light hide details which are brought out by light tones of shade, but it softens details which are shown by small bits of shadow or cast shadow which come in the mass of the light. When looked at directly, these shadows may seem the darkest ones of the object, but when the eyes are blurred they will appear much lighter than the large masses of shadow. Thus in Fig. 15 the narrow shadow formed by the midrib at the top of the leaf will probably appear to the student darker than the wide shadow the leaf casts on its background, or even darker than the cast shadow of the object on the panelling. The narrow shadow on the leaf is really lighter than the cast shadow of the leaf, for it is lightened by the strong rays of light from the parts about it, which are diffused and slightly

blended with the rays from the narrow shadow. In all cases a narrow shadow between two surfaces, in the light, and nearly in line with each other, will appear lightest where it is narrowest, and if a space separating two surfaces becomes very narrow, the light about the narrow shadow may be strong enough to nearly obliterate it. The

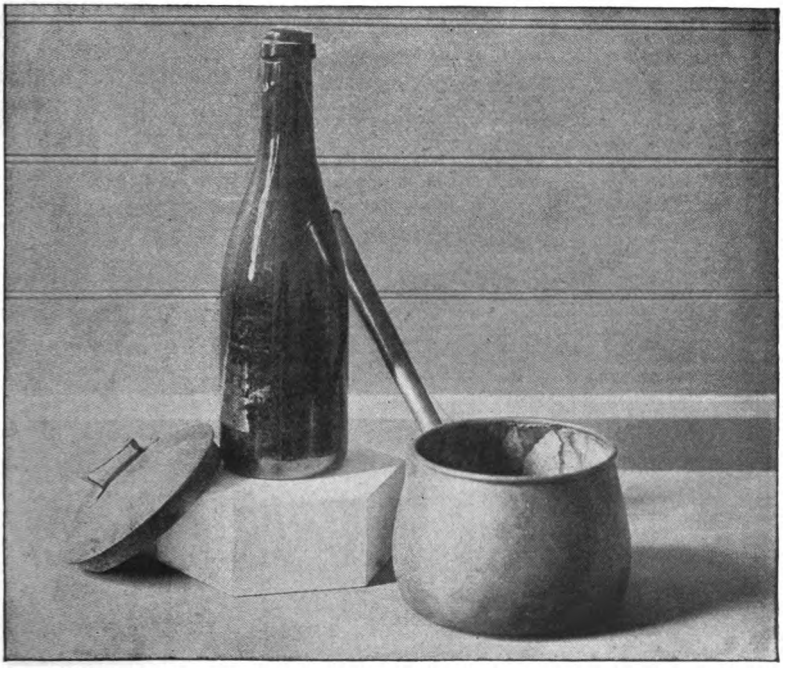


FIG. 17. From Photograph.

narrow line of cast shadow under the plinth in Fig. 14 illustrates this point; it is much lighter under the lightest part of the plinth than under the nearer and darker part of the plinth. The figure also shows how strong light hides the form, for in the strong light the upper edges of the pyramid and the plinth are barely visible.

Infringes upon narrow darks within it. — The black pencil in Figs. 8 to 13 inclusive also shows how light infringes upon and weakens narrow darks, for the pencil seems smaller where it comes in

front of the light plinth than where it is seen against the gray background; and the greater the contrast of light and dark in the group, the greater the difference between the apparent diameters of the two parts of the pencil.

Hides soft shadows. — Fig. 17 shows again the way in which darks are lightened by the strong lights near them. The shadow of the cover cast upon the light face of the plinth seems at first glance to come within the shadow of the cover cast upon the foreground, instead of beginning where the shadow upon the horizontal surface meets the vertical surface of the plinth. This effect is often noticed, but careful observation will show a soft shadow on the vertical surface which continues the soft shadow on the foreground, but is so much lighter than that on the shelf that at first it is not noticed. The soft shadow on the vertical is less prominent than that on the horizontal, because it is lightened by the strong light of the surface which receives it.

The Half Light.

Brings out detail and local color. — The full light changes or hides the color and often makes detail invisible, but the parts of the light between the full light and the shadow bring out the local color, and make all the detail most prominent. Fig. 5 is from a photograph of a wooden cylinder painted white with a brush whose marks were plainly seen, and which show slightly in the figure in the half light only. The brush marks upon the cone, Fig. 6, and upon the plinth, Fig. 14, also show in the half light. The veins in the leaves of Figs. 15 and 18 are most prominent in the tones between the strong lights and the shadows. In Fig. 16 the creases in the tinfoil upon the bottle are seen more plainly between the light and the shadow than in either the light or the shadow.

Detail in half light must be carefully drawn. — The irregularities of surface on the plums, Fig. 18, are seen most plainly near the dividing lines of light and shade, and the rings about the vase are more prominent in the half light than elsewhere. The student must study detail in the half light most carefully, for this detail is most prominent, and gives the character of the object more than detail either in full light or in shadow.

The Shadow.

Does not show detail or local color. — The effect of the shadow upon detail is similar to that of the light, detail being lost for lack of light, and local color being so changed that it would often not be known from the color of the shadow.

Varies in value. — The values of objects of different colors are not changed relatively by shadows when they are placed so as to receive equal amounts of the reflected lights; thus yellow in shadow is lighter than orange in shadow, and so on. But the student cannot determine the values of the different shadows by any theory; for the objects which receive them reflect light so differently that observation alone can determine the values, and the value of a light object may be darker than that of a much darker one.

At first the student will have great difficulty in seeing any difference between the different shadows of the group, and he may be assisted by thinking of the local colors, as the values of the shadows will often be in harmony with the values of the local colors. In Fig. 15, for instance, to most students the shadow on the cast will seem as dark or even darker than that of the cast on the panelling; but if the student thinks of the local colors of the two surfaces, — or better still, blurs his eyes and tries to decide what colors he would use if painting the subject with colors, — he will often be assisted to see the true values of the shadows.

Dividing line of light and shade important. — When objects are bounded by edges, the edges define the shadow surfaces; but when objects are bounded by curved surfaces, the shadows are not sharply defined, but grade into the light and produce the intermediate tones called half light. It is very important that the dividing line of light and shade be carefully drawn throughout, and when it is upon a rounded object the greatest pains must be taken that the gradation does not destroy the effect of the general direction of the line; this shows when the eyes are blurred so that the masses of light and dark are seen.

Defined by an element. — In the cylinder or cone the shadow is defined by an element; in common objects which are variations of the type forms, the dividing line of light and shade will not always

conform to a foreshortened section of the object through the axis, but it may often, in parts, become practically the element of a short cone or cylinder; and if its direction is not truly given upon parts which are cylindrical or conical, their forms cannot be well expressed.

Reflected Light.

Varies in strength. — With any given illumination the strength of reflected lights depends upon the smoothness of the objects on which they are found, and upon their surroundings. A mirror in the form of a sphere would reflect the forms and colors of objects about it so perfectly that the effects of light and shadow would be entirely destroyed by the reflections. Perfect reflecting surfaces are seldom found in common objects, but polished silverware gives a near approach to perfect reflection; the reflection is sharp and gives clearly the form and color of the objects reflected. Polished objects give clear reflections of dark objects as well as of light ones; and, to be exact, we should require another division of the effects due to light and shade, namely, reflected darks. These reflected darks are generally considered as the parts of the shadow which are not lightened by reflected lights. The student, however, should not study from objects whose surfaces are highly polished until quite proficient in representing the simple effects of light and shade upon unpolished objects.

Makes the shadow visible. — The "light" of any object is the surface upon which direct rays of light fall. By direct rays is meant rays from the sun, the moon, or any artificial light, and also the rays from the window by which any studio or room is lighted. That part of the surface of any object which receives no direct rays is called the "shadow," and the lightest parts of any shadow surface are called the "reflected lights." Shadow surfaces receive no direct rays and would appear uniformly dark if they did not receive light which is reflected to them from the light surfaces of objects about them. If not for this indirect and irregularly reflected light shadow surfaces would be visible as darks by reason of the light surfaces about them, but no detail would be seen in any shadow surface. But, as a matter of fact, every part of the surface of any object receives

light which is irregularly reflected to it from all directions; and the stronger these reflected rays, the lighter are the shadow surfaces, and the more prominent is any detail in them.

In Fig. 16 the light top of the plinth is reflected in the bottle as a decided form, bounded by curved lines meeting at points which are the reflections of the corners; and the plinth in Fig. 17 is reflected in a similar way in the bottle upon it.

Is generally dark. — Objects less smooth than the bottles of Figs. 16 and 17 have reflected lights which cause slight gradations in the mass of the shadow (see Fig. 18); and generally the student will find that in the effect of the whole, reflected lights are not lights but darks, which are simply less dark than the strongest parts of the shadow.

In looking at detail, whether in the mass of the light or in the mass of shadow, the student should blur his eyes and see if the detail belongs to the light or to the dark. He should ask himself, "Does the detail appear light or dark in the effect of the whole?" The tendency is to exaggerate the reflected lights in the shadow just as much as the grays in the mass of the light, and if the student does not often apply the tests explained in Chap. II, he will not realize that generally the lights which he sees in the mass of the shadow are darks, and the grays which he sees in the mass of the light are lights.

May come in the light. — The light top of the plinth in Fig. 14 gives bright reflections on the bands upon the lower part of the pitcher. These are reflected lights, though they come in the mass of the light upon the pitcher, and we see that a light object may so reflect that it lightens the light as well as the shadow of any object. The reflection of any light object upon any surface in light or in shadow is never as light as the reflected object, and the reflection of a dark object is not as dark as the object, for the light reflection is darkened by losing the light which the reflecting surface absorbs, while the dark reflection is lightened by the surface reflecting diffused light received from other objects.

The Cast Shadow.

Generally a strong dark. — The cast shadows are generally the darkest parts of any subject, and together with the shadows are often visible when the light surfaces of the objects are invisible. They show the shapes of the objects casting them, and also those of the objects receiving them, and are most important features of any subject.

Varies in value. — The value of a cast shadow depends upon the color of the surface receiving it, and when surfaces of different colors are placed so that they all receive the shadow of any object, the shadow will be darkest upon the darkest color if the different colors receive equal amounts of reflected light. This would, however, seldom happen, and only study of nature will produce a true drawing.

Darker than light or shadow. — Cast shadows are generally darker than shadows and all light surfaces, but no rule can be stated, for the cast shadow on a light color is often lighter than the shadow upon a darker color, and the cast shadow on a light color may be lighter than the light side of a dark object. Thus the cast shadow of a dark tree-trunk upon white snow is lighter than the light side of the tree-trunk, and in Fig. 17 the cast shadow of the cover upon the plinth is about the same value as the light upon the cover.

Varies in sharpness. — Shadows cast by sunlight and by artificial light are sharply defined; those by studio light are sharp near the objects that cast them, and softer as they recede. Shadows cast by a studio light are varied by reflected lights as much as are the shadows, but by sunlight or by artificial light cast shadows upon any surface are more nearly of uniform value.

Masses with the shadow. — The cast shadow and the shadow of any object generally form a mass of dark, which in contrast with the mass of the light produce the effect of the object. When the object is not near the eye, these masses are very prominent, and often no detail can be seen in them.

Hides contours and detail. — As already explained, unimportant detail disappears in the shadow, and in the same way it disappears in the cast shadow, and often even the form or contour of an object

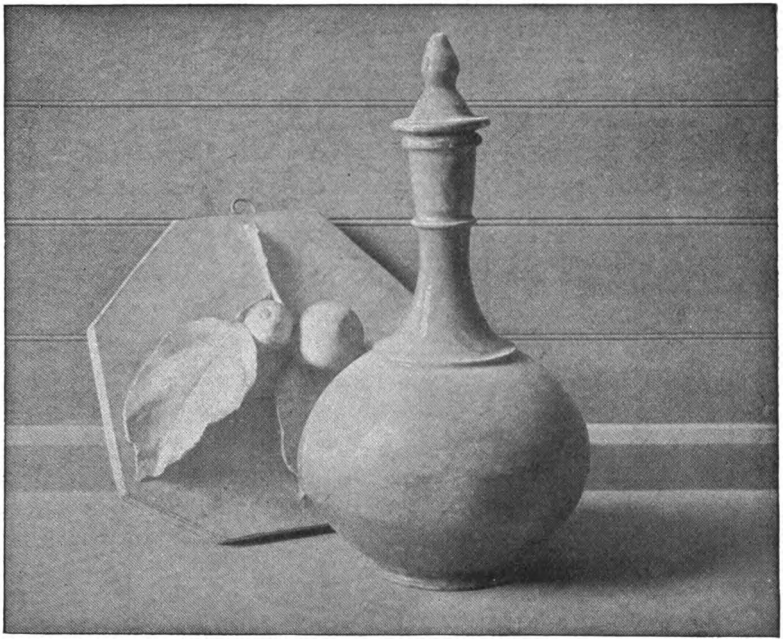


FIG. 18. From Photograph.

is lost in the darkness of the cast shadow. Thus the lower right contours of the bottle in Fig. 16 and the pot in Fig. 17 are invisible for a little distance, and the contour of the cylinder in Figs. 8, 9, and 13 is lost in the shadow thrown upon it by the plinth. The contour should not be represented when it is not seen, for much of the charm of the best artistic work is due to the subordination of detail, and disappearance in part of the contours, due to the shadow and cast shadows.

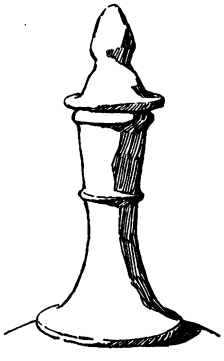


FIG. 19.

Must be carefully drawn. — The importance of carefully drawing the dividing line of light and shade on all objects has been mentioned, and from what has been said the student will realize that careful drawing of the cast shadows

is of no less importance. The drawing of the masses of dark which are bounded by the dividing lines of light and shade, and the outlines of the cast shadows will often do more to suggest the object than a correct contour; but if these parts are correctly drawn, the contours will probably be in correct drawing. In general as much attention should be given to the forms of the shadows and cast shadows as to the contours.

Helps in the drawing. — The forms of the shadows and cast shadows are often easier to see than those of the contours which are often invisible in parts, and generally the shadows are seen first and contours last; therefore, in light and shade study it is natural that the student begin with the lights and the shadows instead of with the contours.

Blends with the shadow. — Upon objects such as those of Fig. 18 the cast shadow and shadows often blend together. Thus the cast shadow of the leaf in light passes around the plum and into the shadow upon the plum. Upon the vase each projecting ring or band about its surface casts a narrow shadow, which passes around the vase and loses itself in the shadow on the vase. Such cast shadows are visible only upon the light of the object, and never extend into the shadow to darken it. They are sharpest and darkest nearest the parts that cast them, and they must be drawn with great care. The same care must be exercised in drawing the dividing line of light and shade upon even the smallest details of the object. Fig. 19 indicates the mass of dark formed by the shadow and cast shadows upon the top of the vase, and the student must study such details as carefully as they are indicated in the figure.

Other Effects.

Several lights. — The effects due to the most common lights have been briefly explained, and the student will understand that they may be varied in many ways. Instead of one window a room may have several windows. Most rooms not intended for studios have several windows, and the effects of light and shade that may be seen are very numerous. Instead of one artificial light there may be many, in which case the shadows will clearly and sharply

cross each other, so that the darkest spot will be that receiving the greatest number of separate shadows. These shadows may be traced clearly through each other just as different washes applied with a brush over washes previously dried are each clearly seen.

Daylight and lamplight; rules impossible. — An object may at the same time be exposed to daylight and to artificial light, and

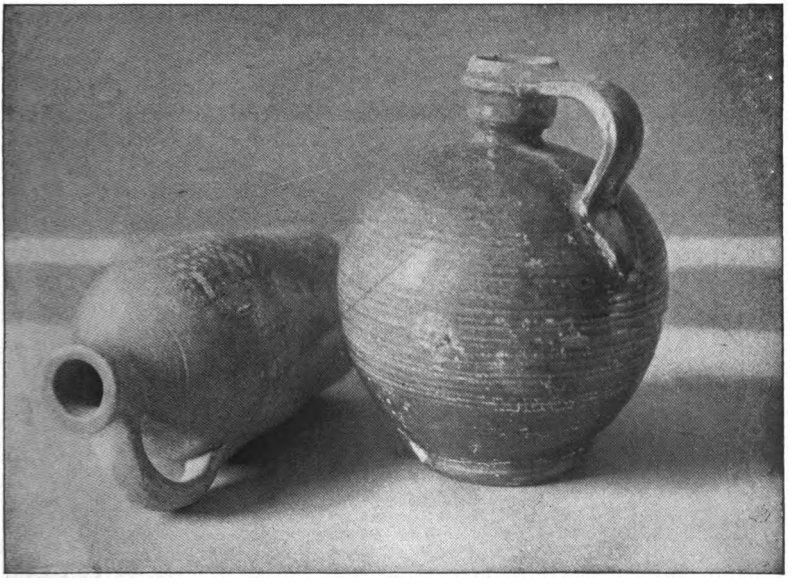


FIG. 20. From Photograph.

the light and shade and color effects of any simple subject may be so infinitely varied that the absurdity of the attempts of those who give rules for the production of drawings which shall represent nature's effects is obvious. No one can say how much light there should be or how much shadow, and all that is written upon this subject should be carefully studied to see that it does not attempt the impossible. Leonardo da Vinci says that "the shadows and lights should be united or lost in each other without any hard strokes or lines; as smoke loses itself in the air, so are your lights and shadows to pass from the one to the other without any apparent

separation." But even so noted a man as he should not be accepted literally, without study, and if this statement or any other statement

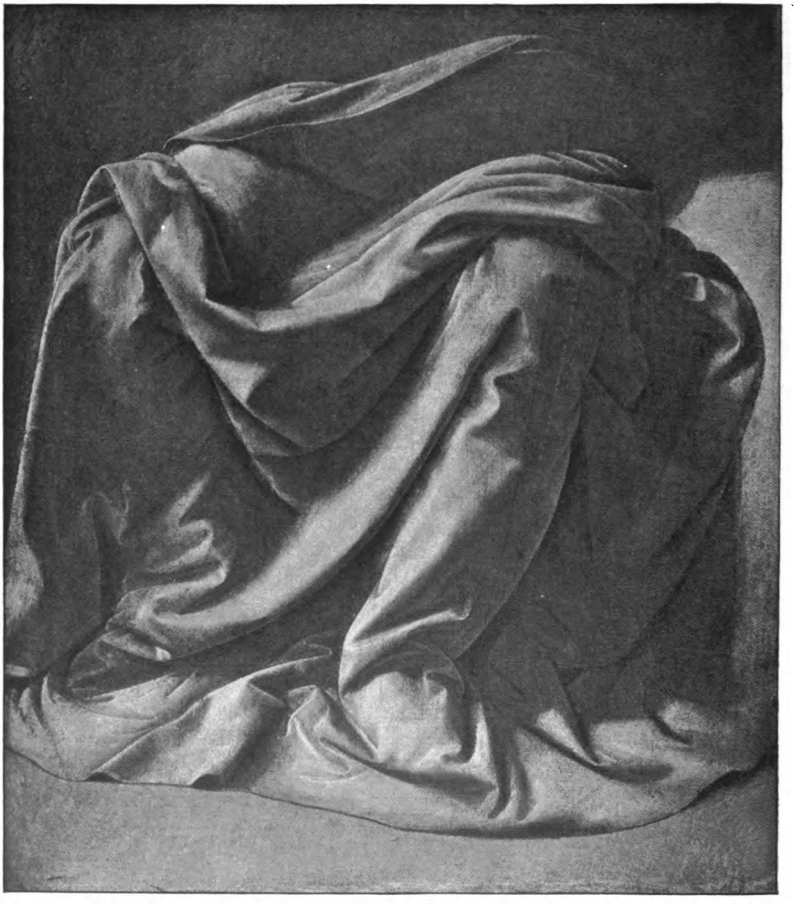


FIG. 21. From Study by Leonardo da Vinci.

does not agree with nature, or with the artist's own drawings, which have been accepted as good, the student may conclude that the artist did not say just what he meant.

Fig. 21 is from a study of drapery by Leonardo da Vinci, and shows the care with which the greatest artists work and study, even

after they become famous. It also shows that the advice as to the softening of the shadows into the lights means not what the average reader would suppose, but simply that there must be the gradation of the half lights from the shadow to the light, as previously explained. Art students when given such a subject as Fig. 21, often attempt to make the drawing without carefully studying any of the lights, shadows, reflected lights, etc., of the subject, and if asked to draw them all as carefully as in the figure, they feel that they are imposed upon, and that such study of detail is mechanical and unnecessary.

Fig. 21 shows the careful drawing which characterizes the artist and which he puts into the most important parts of all his work; and the student should be content to study nature carefully until he knows that he can, if necessary, draw all detail that he sees without destroying the masses of light and dark which are the first in the effect felt, though generally the last that the student succeeds in representing truly.

Important Principles.

No rules for the production of drawings can be stated, but the elementary student will be assisted to see correctly if he understands that nature's effects are generally in harmony with the following principles :

1. Objects are seen through contrasts of masses of light and masses of dark.

2. Appearances of light and dark are relative, any tone being light in comparison with darker tones, and being dark in comparison with lighter tones.

3. The shadow and cast shadow form together a mass of dark, in which, especially when objects are at a distance, details are hidden. This mass of dark, in contrast with the mass of light, expresses the forms of the objects, and is thus of first importance to the student of light and shade.

4. The mass of light causes much of the detail in it to disappear, and lightens the effect of all small shadows within it so that whatever detail is seen in the light does not destroy the effect of the mass.

5. In any subject there is one light which is lighter than all others, and one dark which is darker than all the others.

6. When light and dark are juxtaposed, the light seems lightest nearest the dark, and the dark appears darkest nearest the light.

7. A retreating shadow surface or dark object appears darkest nearest the eye.

8. A retreating light surface or light object appears lightest nearest the eye.

9. Of two dark objects of the same color and in the same light, the nearer appears the darker.

10. Of two light objects of the same color and in the same light, the nearer appears the lighter.

11. The cast shadow of any object is darkest and sharpest in outline nearest the object which casts it.

12. When the shadow of any object falls upon two intersecting surfaces, for instance, a horizontal surface supporting a vertical, the shadow must pass continuously from one to the other, and change its direction at the intersection of the two surfaces.

13. The shadow of a straight line upon a plane surface is a straight line.

14. The shadow of a straight line upon a curved surface generally appears curved.

15. When a sphere is exposed to one side light, the highest light is not upon the contour of the sphere but within the contour, and from this glitter or high light there is a gradually increasing tone in all directions toward the contour. The strongest shadow on the sphere is at the dividing line of light and shade, which generally appears an ellipse. The strongest reflected light is between the contour and the strongest shadow.

16. When a cylinder is exposed to one side light, the highest light is not upon the contour, but upon an element within the contour. From this element there is a gradually increasing tone in both directions toward the contour elements. The strongest shadow is upon the element which separates light from shadow, and the strongest reflected light between this element and the contour element.

17. When a cone is exposed to one side light, the highest light is upon an element which is within the contour. From this element

there is a gradually increasing tone in both directions toward the contour elements. The strongest shadow is upon the element separating light from shadow, and the strongest reflected light is between this shadow element and the contour element.

18. Objects are either in whole or in part lighter or darker than the parts against which they are seen, and therefore the true values and effect of any object cannot be represented without representing the values of the parts surrounding it.

19. Any object may present an infinite number of different appearances.

CHAPTER II.

VALUES AND THEIR TESTS.

VALUES.

Definition. — Value means the relations of tones to each other, and concerns the quantity of light or dark they reflect without regard to color, so there may be many different colors of the same value. With different colors there is usually a difference in value, so that a light and shade drawing may generally be true to nature in values and yet suggest the different colors throughout the subject.

Value has to take into account not only different colors but different tones of the same color, and also variations in the effect of one tone or color which are produced by distance or by light and shade, and value is generally understood by artists to mean variations of light and dark produced by any cause whatever. All the variations of effect explained in Chap. I are differences in value, and the student will at once see that upon the values depends most of the merit of any black and white study.

Unit of value. — In a light and shade drawing black is usually taken as the unit for comparison, the strongest values being those which are nearest black, the lowest (lightest) values those which are farthest from black. In color work the unit for comparison is white, the strongest values are those which reflect the most light to the eye, and the lowest (darkest) values those which send the least light to the eye.

Truth of value. — The art student should be continually asking himself if his drawing is like nature, and his first problems should deal principally with comparisons of his work with nature, which he will generally be able to make, so as to discover any important differences. Here the question arises, " How far is it possible to imitate nature? " The strongest light of the artist is given by white paint; even the effect of sunlight upon pure white must be represented by means of white paint. Hence the bright lights of nature are often

much brighter than those of a painting seen in the light of any common gallery or room. It is natural, then, to ask if it is possible in every case to produce a picture which is like nature. It is well to consider this point, although this question is more important to the artist than to the elementary student who works in a studio and does not have sunlight effects to represent.

The strongest lights of a landscape, whether in sunlight or in moonlight, are represented by the same white paint, with perhaps faint tints of warm and cool colors respectively added. Sunlight is many times brighter than moonlight; and yet one picture suggests sunlight satisfactorily, and the other, moonlight. Neither picture represents nature, but simply suggests one of her effects. In each picture the artist's problem is very different from that of the student, who works indoors and can place his drawing beside the subject and study both at an equal distance and in the same light. In such a case, though the glitter lights of the subject may be lighter than those of the drawing, there is not the great difference that exists between the high lights out of doors and the effect of white paint in a studio; hence the art student is often able to make a drawing whose contrasts are as great as those of the subject in a studio. With color he can do this more frequently than with black and white. But when he attempts sunlight effects, it is impossible to obtain in any drawing lights equal in intensity to those of nature, With the same contrasts of black and white and color he is obliged to give the effect of moonlight and of light many times stronger.

Not reproduced, but suggested. — The artist is able to represent with the same pigments such very different effects, because he is not obliged to *reproduce* the actual colors or contrasts, but simply to *suggest* them. As shown in Chap. I, nature's effects are due to contrasts of masses of light and dark and color, and whenever these contrasts are suggested, the effect of the subject will be created. The masses are much more simple by moonlight than by sunlight, but either effect will be expressed by representing correctly the relations of the various masses of light and dark; in other words, the problem is simply that of values. If the relation of any light or dark to every other in the moonlight subject is correctly given, the picture will create a satisfactory impression of moonlight,

and in the same way the effect of sunlight will be given by a picture which gives the relations between the different masses of the sunlit landscape.

High or low. — In the case of moonlight or that of sunlight, the picture may be in a high key or in a low key and still produce a satisfactory impression of the subject. Thus the same sunlight effect may be represented by two pictures, one very much darker throughout than the other; or the same moonlight effect, by two pictures of which one throughout is very much lighter than the other. The relations of light to dark in each pair are, however, the same, and so they give the effect of sunlight or of moonlight, while their general effect is very different. It is in fact possible for a satisfactory impression of moonlight upon any subject to be given by a picture whose general effect is little, if any, darker than that of another canvas which gives a satisfactory impression of sunlight upon the same subject.

Whether the light upon any subject be strong or weak, it will produce masses of light and dark and gradations of tone; and if the relations of these masses and tones are correctly represented, the effect of the subject will be expressed, whether the contrast between the different values is very strong or not. There are no more lights or no more shadows with a strong light than with a weak one, and there are as many gradations of light and shade with the former as with the latter; in fact, there is often less gradation with the strong light than with the weak. So it is simply a question of values, and the weakness of pigments in contrast with nature is a difficulty which has been greatly magnified. To produce a strong picture it is not necessary that there should be violent contrasts of light and dark, but simply that the relations of the principal masses be truly given; and the student should apply himself to the study of values until able to see quickly and render truly the relations between all parts of a subject; for until he can do this he cannot produce a picture which will give the effect of nature. He may make the most perfect studies of form, but if without values, they will be unatmospheric, unnatural, and unsatisfactory.

Must be studied. — The fallacy of the belief that all that a student has to do is to learn to draw, and that values will come then as a

matter of course, is proven by the work of many who are splendid draughtsmen, but who, not having studied values, never succeed in making drawings that are not almost without atmosphere and the sense of color.

No black in nature. — It is important that the student should understand that in nature he sees no pure black. Black is the absence of all light, and light is color. In a perfectly dark room not even the whitest non-luminous object can be seen. If a little light is allowed to enter the room, the lightest objects will be dimly seen, but they must appear of some color; and the darkest objects visible will not appear pure black, because they must send some light to the eye, and light is color. When there is very little light, however, there is so little color that it is often difficult to realize that we do not see black. The student will be assisted to realize how much light and color there is in nature if he looks outdoors from a room which receives light from one or two windows in one side of the room. If he stands at the opposite side and, blurring his vision, looks through a window (which thus serves as a frame for the landscape seen through it), he will be surprised to find that the light-colored window frame seems darker than the dark objects outdoors; and even if white, the frame in shadow will generally appear darker than the darkest objects outdoors, unless they are quite near the window.

If a piece of black velvet is held near the eye and wholly in the shadow of the hand, it will appear practically black, for it is so near the eye that the atmosphere does not change its color; it receives no direct light, and reflects very little of the reflected light which strikes it. If the student will now compare the darks of the room with the black thus held in the hand, they will be found to be quite gray and luminous in contrast with the black. This is true of the strongest darks of groups, such as those of Figs. 14, 15, and 16; and even black objects or draperies in the room will seem much lighter than the black in the hand. This is in accordance with the law of aerial perspective, which causes the nearer of any two objects equally dark to appear the darker.

Little black in any drawing. — The student who works in color will do well to make the absence of black in nature the basis for a

rule which forbids the use of pure black in any color study. But the student of *light and shade* works with mediums far less powerful than color, and it is often necessary or desirable for him to represent the strongest dark in his subject by the strongest dark to be obtained with the medium employed; for by so doing he is able to give more of the gradations in the mass of the light than can be given if the strongest dark of the group is represented by gray. And whenever the strongest dark of any subject seems very dark in contrast with the light, and no detail is seen in it, the student should generally represent this dark by the strongest dark to be obtained with the medium used. But this accent or spot of black must be very small; for if any large part of the drawing is without the gradation seen in all parts of the subject, it will not be atmospheric, and therefore not natural. The student must have in any drawing one high light, that is, one light which is brighter than all others, and one dark which is darker than all other darks, but he must be particularly careful not to use pure black freely.

As already shown, a drawing may be upon a light key or upon a dark one. But the most truthful representation of the appearances due to daylight, either indoors or outdoors, will be given by one which at first glance gives the impression of light and color. Generally the student will find the lightest drawing which can be made to suggest the masses of light and dark, and the principal gradations in the mass of light will be most true to nature; for when it is seen from a short distance the detail is seen, and when seen from a long distance it gives the effect of light and nature, which cannot be produced by a drawing whose lights are so dark that at a distance the drawing seems largely or wholly dark.

Values may be changed. — The value by which any part of any subject shall be represented depends somewhat upon the extent and nature of the subject. Thus, suppose a group similar to that of Fig. 18 placed upon a table covered with black drapery, which hangs in folds to the floor, the group being lighted by a feeble light from behind or at the left of the spectator, and a window being situated some distance to the left of the group, through which a sunlit landscape is seen. If the room with its contents is to be represented, the mass of light will be the window. The group will seem composed of gray colors, and the strongest darks will be upon the black

drapery. If simply the group is to be represented, the most truthful drawing will be that which gives the values seen when the group is compared with its surroundings. The most truthful representation of the landscape alone will be that which gives the impression of the brilliancy of light and color seen through the window. The student should aim to represent truly not only the relative values, but as far as possible the actual values seen in any subject, and in order to do this he should compare the values with pure black material which is held in the hand and shaded so as to appear black.

When the student can represent truly the actual values in any subject as far as this is possible, the values may be changed, just as the form and color may be changed, to more perfectly express the artist's sentiments. Thus the values of any subject such as the group alone may be changed so that the lights of the group are lighter than they seem when compared with the high lights seen through the window, and so that the darks are somewhat darker than the darks of the group appear when they are compared with the strongest darks of the room. And in representing the landscape alone its darks may be made darker than they seem when they are compared with those of the room. But in all work in which it is desired to give the effect of the light and color seen in nature, it will be well to keep the drawing as luminous as possible, and to have the strongest darks in it simply the accents or small bits of dark, which may be pure black or not, according to the nature of the subject and the medium used.

Fixing a charcoal drawing darkens it, especially in the lighter tones. This is another reason why such drawings should be very luminous.

Necessary in all work. — Students often wish to learn to illustrate; that is, to take lessons that will enable them to make drawings to be reproduced by some of the special processes. They often think that they can do this without going through the severe training needed by the art student. But it is a mistake for any one to study processes until he can draw, and the student who wishes to illustrate should study art in the same way and just as long as the artist studies. When one knows how to draw, the skill required for making drawings to be specially reproduced will be gained in a very short time.

Tests for Values.

Perfect sight not common. — The first and most difficult problem for the art student is to learn to see, for only a few ever learn to see perfectly; and those not giving the matter special attention seldom see the actual appearance of either form, light and shade or color.

To realize perfectly what the eye pictures for the mind to read concerning simply the apparent forms of objects requires many years of serious study, and is so difficult that even after this study the artist of reputation is very apt to be deceived and draw what is very different from the image of the eye. In "Free-Hand Drawing" it was shown that a course in free-hand perspective assists the student to avoid faulty representations of the geometric forms, which are most likely to deceive even the practiced eye of the artist. Any student who draws the geometric forms, and tests them as explained in "Free-Hand Drawing," will soon realize that it is difficult to see correctly; for he finds what he thinks he sees to be very different from what the tests prove that he does see, and it is easy for him to convince himself that he cannot see correctly.

Values more difficult than drawing. — To convince an art student that he cannot see light and shade or color correctly is far more difficult than to prove that he cannot see form correctly. To draw correctly requires, first, an eye naturally true, and, second, a serious and extended course of study; but almost every serious student can in time teach himself to represent form correctly. The same student may work many months, even with the assistance of a teacher, and fail to see values or color correctly.

To give the actual facts pictured in the eye concerning light, dark, and color is so difficult that few succeed; and even after years of study many see in nature only the actual facts known, or what they have become accustomed to think they see concerning the local colors of objects.

Values not taught. — If artists and teachers generally made the study of values as important as that of form, doubtless many students who do not understand what value means would become able to see values correctly; but the number would be small compared with that

of those who are able to draw correctly, for serious students of the best teachers often work for many months before they realize how incorrectly they see values.

The teacher who insists upon correct values requires much patience and ingenuity, for his pupils cannot readily help themselves, nor can they believe the teacher who tells them, for instance, that they ought to see, in some special group, dark blue lighter than yellow, when they know that they see it as they think it ought to appear, — darker than the yellow. In such cases the teacher must either be content to say: "If you cannot see it, you must draw it as I say, and in time you will see it as I do," or he must prove to them that at first their eyes tell them nothing but the most glaring falsehoods about all that they see. When pupils realize this fact, and have once received a genuine sight impression concerning values, they will ever afterward see things in a new way, and their improvement will be rapid.

Eye sees details instead of values. — To see values and realize the effect of the masses, the eye must be used for this purpose only. This is a difficult problem for the student, for naturally the eye is focused upon a single detail, which is clearly seen. The vision passes rapidly over the whole of the group, taking in all its details by means of this careful study, which is of just the same nature as that which the scientist bestows through his microscope upon the specimens he studies. The only difference in their methods is that the motion of the eye of the art student is very rapid, and that the lens of the eye takes the place of the microscope. The scientist sees details, and very properly, since these are what he is to describe. The art student also sees details, and too often his work indicates that he must have examined each little bit as if through a microscope. In his first drawings he usually so magnifies the importance of every detail that his drawing is unintelligible, and gives not the faintest suggestion of the impression produced upon the eye which sees the effects of light, dark, and color in their true relations.

The art student must learn that the artist and scientist work for entirely different ends, — that the aim of the artist is not detail, but the spirit and character of the whole, and that this cannot be obtained without making it of first importance and thinking first of the long lines, the large masses, and the effect of the whole subject.

Blurred vision necessary. — The effect of any subject is never realized when the student looks at any one part; he must look at the group all at once. The whole of any subject can be seen at once only by seeing all its parts equally and thus indistinctly. That is, the eye must focus on no one part, but be in focus for an object in front of or behind the group; then all its parts may be seen indistinctly at one time. The student will realize what is meant by blurred vision by closing the eyes gradually until the group can barely be seen between the lids and the lashes; this cuts off most of the light and obstructs the sight so that the objects are blurred. Blurred vision may also be obtained by holding a pencil in the hand and in front of the group and looking at the pencil, which will be seen sharply, while the group will be seen very indistinctly. To see the whole at once is difficult for the art student, but the artist finds it easier than the searching gaze which the art student employs, because the artist sees effects unconsciously with blurred vision, which does not tire the eyes.

Many aids to the correct seeing of values have been used; among them the following are those of most assistance to the student.

Claude Lorrain mirror. — This is a mirror which gives a reduced image of the object, and has a black reflecting surface which diminishes the light so that the relative values may be studied more readily than in the group. A substitute may be made by painting one side of an ordinary piece of plate glass with ivory black.

Common mirror. — This is often used by artists and is a valuable aid, as its image reverses the lines of the group and the drawing, and by showing the parts in new relations makes errors prominent to which the eye has become accustomed. When the drawing is placed beside the group, and the mirror as far as possible from the group, it enables comparisons to be made from a distance twice that which could otherwise be obtained. The student will obtain much assistance from this mirror.

Diminishing glass. — This is a lens concave on one or both sides, which produces a small clear image of the group. The image is so small that it may readily be seen at one glance, and thus the values of the different parts be more easily seen. But even here the tendency is for the students to study the details of the image instead of its effects, and thus lose the advantage to be derived from the glass.

Though these aids are very valuable, they often fail to make the student see for the first time the fact that a dark color may appear lighter than a light color, and the only means on which, according to my experience, the beginner can safely depend for corrections of values are the blur glass and the card described on page 57.

The blur glass. — This is simply an ordinary magnifying glass of about 15 inches focus. It should not be less than 12 inches focus or more than 16 inches or 18 inches. A rough lens about 2 inches diameter can be obtained at an optician's for about fifteen cents, and may be framed by cutting a circular hole in a piece of cardboard so that it will receive the lens, and then cutting smaller holes in two more pieces, and gluing one to each side of the first piece. The glass is thus protected so that it will not break if dropped, and the cardboard is also an improvement because it hides from sight all except the parts seen through the glass. If this glass is held so that the group may be seen through it, the outlines will be blurred and all detail softened. In this way the masses of light and dark are rendered so prominent that the student sees them as perhaps he never would without the glass.

It is said that the use of such a glass must be injurious, and consequently pupils should not be allowed to use it. Those who think thus do not understand that the glass is to be used not for seeing, but to prevent seeing, and should not be used to look *through*, but to look *at*. In other words, the eyes must be focused upon the glass held in the hand, and not upon the group behind the glass, for if the student looks through the glass at the group, he will strain his eyes and be almost as badly off as when without the blur glass, for his eyes will adjust to the glass so that he will still see too much detai..

To teach the proper use of the glass, secure a sheet of gray paper or of cloth of one color upon the wall or any vertical surface so that its lower portion may rest upon a horizontal surface. Ask the student to make a light and shade drawing representing simply these two surfaces. This will cause him to decide as to the difference in value between the two. Having made the drawing, ask him to hold the blur glass up so as to see through it the vertical surface, and then ask him to look not through the glass, but at it, to discover the color which it appears. Now ask him to hold the glass so that through it

the horizontal surface is seen, and then to look as before at the glass instead of through it. Having held the glass carefully to see the color it appears to be when in front of each of the two surfaces, ask the student to move the glass up and down, slowly at first and then as rapidly as possible, so that it shall transmit first the color of the vertical surface and then that of the horizontal. If this motion is continued and the student looks at the glass, he will discover that the difference in color between the two surfaces is much greater than what he thought he saw and what his drawing represents; and he will at the same time have gained a true impression of values and learned to use his glass properly. The use of paper or cloth of one color is of great assistance in enabling the pupil to look at the glass instead of through it, and this experiment should be the first lesson of pupils old enough to apply it, and should be repeated as often as is necessary to enable all the students to use the glass properly; for if they do not use it properly they injure their eyes and destroy their best chance of becoming independent and able to correct their own light and shade studies. When large masses are compared, the blur glass should always be held as far as possible from the eye; and when any part is studied it should be held, if possible, far enough from the eye to cause the part to blur into a formless mass of color which fills the entire glass, and which is to be looked at as if upon the glass.

Instead of moving one blur glass to cover the parts to be compared, two blur glasses may be used; they should be held the same distance from the eye and so that the two parts to be compared may be seen at the same time.

One of the strongest influences causing false ideas of value is the contrast of light and dark in juxtaposition, and the tendency of the student to compare only parts which are near each other. If he would compare parts with others farther away and with the masses, he would see how contrast effects deceive the eye. When the blur glass is properly used, it will show the relations of parts to each other and to the masses, but some students will require more assistance than the use of the blur glass.

Black paper. — Pupils who cannot see values by the use of the glass so as to discover, for instance, that the shadow surface of the plinth (Fig. 14) appears darker than the foreground, will be assisted

if the teacher holds in front of the group a sheet of black paper in which holes are cut so that through one the student sees simply a part of the shadow, while through the other he sees simply part of the foreground. When the two parts to be compared are seen without the influence of the surrounding parts, there are few students who will not see the values truly. The paper should be held near the group, and both sides should be a dead black in order that the back surface of the paper may not reflect light enough to the group to change its values.

The difficulty is to enable the student to realize for the first time that the light object often appears darker than the dark object. A mug of a light yellow color and having a pewter cover is an excellent object to use to show this fact. If it is placed on its side so that the cover is toward the light, the cover will appear lighter than the shadow surface of the mug. Few young pupils will realize this fact, and those who do realize it will be astonished to see the great difference in value which is shown when the two parts are compared by the use of the black paper which the teacher holds near the mug. Pupils who fail to see the values by use of the blur glass will almost always see them when they see in this way simply isolated spots of each color, and teachers should use this test when students show that they do not use the glass properly.

Black card. — The pupils may apply this principle by using a piece of black cardboard through which small holes have been made at varying intervals. The card may be of any smooth piece of cardboard. The holes should be clean, round, and of varying sizes, and they should not press out the surface of the card; if this happens, it should be pressed back or trimmed with a sharp knife until both sides are smooth and flat. Both surfaces should then be colored with india ink or any dead black color; and also the edges of the holes. If this card is held in front of the group, it will hide from the eye all except the small parts which may be seen through the pin holes, and the card may be held so that any two parts whose values are to be decided may be seen through different holes. This card is of great assistance to elementary pupils, and it should be used occasionally to verify their work. The size of the holes depends upon the distance of the group and the distance at which the card is

held from the eye, and may vary from a pin hole to one ⅛ or ¼ of an inch in diameter.

This card will assist the student to obtain true values and also to obtain what is essential and difficult to secure, — a gray and luminous drawing. The tendency of the pupil is to pile on the charcoal and make a black, heavy drawing, and it is difficult for pupils to realize that effect and solidity are not due to black, but to contrasts of masses of grays; when the student looks through the card which is shaded by the hand, he realizes that there are no blacks in his subject.

The chief value of the black card lies in the fact that it enables each pupil to remove at will the deceptive effects due to the contrasts of different values. If he could or would use the blur glass properly, the card would not be necessary; but it is so difficult for some to look at the glass instead of through it that the card is very helpful.

Black frame. — A piece of black leather or cardboard in which a rectangular opening is cut will help to impress this fact of the luminosity of nature's effects upon the student, and to make him realize that a true drawing cannot be one which is black or heavy.

Light into shadow. — The student will often be assisted to see the values of two parts, as, for instance, the cast shadow upon the white cast (Fig. 15), and that of the cast upon the panelling, if the teacher holds or places an object so that it shall throw the whole of the cast into shadow. The pupil will often make the cast shadow on the cast as dark as that on the wall, for the contrast of the shadow and light upon the cast makes the shadow appear much darker than it really is. If the light parts of the cast are thrown into shadow, the part originally shadow changes but little in value, for it receives no more, and generally but little less, light than at first; and when the effect of contrast is removed, the student will see that the cast shadow on the cast is much lighter than that on the background.

Study at a distance. — The least mechanical and most satisfactory test, and the one which should be applied most frequently, is simply placing the drawing beside the group and comparing it with the group when the student is as far as possible from the group. When comparing them, the eyes should be out of focus, so that the

drawing and the group may be seen equally at the same time, and the student should ask if the drawing gives the impression of the group and of nature, or if it gives the effect of a sheet of paper slightly tinted. Does it present the same masses of light and dark that the group does, and are the contrasts of these masses as strong as those of the group? Are the darks of the drawing as simple and dark as those of the group, or are they cut up by exaggerated reflected lights? Are the lights of the drawing as broad and as light as those of the group, or are they cut up by exaggerated grays? The student who will ask these questions when he sees both drawing and group equally, and of course indistinctly, can hardly fail to discover the most important errors of the drawing.

It is very important that the drawing be thus seen from a distance repeatedly from its early stages, until its effect agrees with that of the group; when this happens the student must complete the drawing by giving the essential detail. While drawing this he must be careful not to change the masses, and until the drawing is completed it must be viewed from a distance occasionally in order to make sure that the detail is not too prominent.

Use of the hand. — A convenient and simple way of obtaining the results given by the use of the black card is afforded by looking through a small opening which may be formed by compressing and bending the first finger upon the thumb. The hand may be moved so that one after another the parts to be compared may be seen through the finger, or both hands may be used and two parts compared at once by viewing one through one hand and the other through the other.

Tipping the head. — Another test, which is simple and very valuable, is that of tipping the head until the eyes are in a vertical line instead of in a horizontal one. Any one who will view the simplest landscape in this way will be surprised to see how much more color it seems to have than when seen naturally. The principal reason for this is that when the head is tipped the objects are seen in such unusual relations that their forms are not thought of, and all the attention is attracted to contrasts of light, shade, and color. The student of color will find that this test accomplishes the same result as the use of the blur glass, and it will be equally valuable in the study of light and shade.

Tests inferior to feeling. — At first every student will require some mechanical test or aid to enable him to see values correctly, but he must not depend upon these tests any more than in determining contours upon measurements of proportions ; for tests are of no more assistance in producing a work of art whose values are true than measurements are in producing correct drawing. Good art can never be produced mechanically, and the artist must depend upon his eyes and his feeling for both good drawing and good values. But the student will obtain his education in the direction of values just as he will in that of form, and if he does not adopt some means of discovering the errors of his first studies, he will repeat them and possibly never discover them.

Tests lead to feeling. — The student is advised to apply all tests with great patience in his first work. He should be satisfied to prove his work as carefully as possible until he knows that his eyes are to be depended upon for results which will harmonize with those given by the application of the tests. After this he must depend upon his eyes and his feeling for the fine results which distinguish art from industry. The student who does not use the tests until he has proven his ability to see correctly without them, or at least to obtain by sight results equal to those given by the application of the tests, acts very unwisely and will be compelled to spend much more time in acquiring his elementary training than he would if he chose to profit by the tests. My experience has shown that students who think it unnecessary to apply tests generally make a series of drawings of which the last is no better than the first, until they finally discover that the rest of the class have completed work which they are as far from doing as they were at the first of the year. At this time they generally decide to try the tests, and the result of such decision is often as surprising to the student as to the teacher ; for frequently I have known such students to make a drawing as false as possible, and the next day, after having seriously tried to follow directions and apply tests, to make a drawing which was quite true and satisfactory.

The student must use tests in his first work, for in no other way can he learn how different appearances are from the facts, but he must aim to dispense with the blur glass and other mechanical means as soon

as possible. In order to do this he should begin by working by sight without the aid of any tests, and should continue in this way until he thinks his drawing is correct, when he should apply the tests. When he has worked long enough to obtain by eye alone results which the tests do not change, he may continue his work without the aid of mechanical tests, depending partly upon comparisons at a distance, blurring the eyes, and tipping the head, but principally upon his own feeling and cultivated perceptions.

CHAPTER III.

AIMS OF STUDENT AND ARTIST.

The Student's Aim.

Truth the first essential. — The first aim of the art student should be to learn to see and represent truly nature's effects, for if he cannot represent truly the form, light and shade, and color effects of natural objects before him, he cannot expect to represent the conceptions of his mind. Ideas of all forms, animate and inanimate, must be based upon the objects and life found in nature. A famous painter has said that it takes a master to represent nature truly, and certainly this is a point beyond which few can expect to go, for the poetic temperament necessary to ideal work is very rare, and the art student should be satisfied to study seriously until he is able to represent nature truly and readily. Many students are deceived and led to work for false standards by the oft-repeated statement that the aim of art should not be truth, but idealization; but it cannot be shown that the highest art is possible when one is not master of the simple art of truthful representation of natural objects.

Drawing must be natural. — To produce a great work of art, the mind must be perfectly free to express itself without thought of the materials or methods employed. The painter cannot do this if his attention is frequently diverted to the drawing, light and shade, or color involved, or to the manipulation of his materials. To work freely he must give the drawing, light and shade, and color readily, and be as little conscious of the handling of the mediums used as is the orator of the separate words by which he expresses the emotions of his mind.

Art simplifies nature. — Some of nature's effects are beyond the power of paint or other mediums, and in order to convey a suggestion of them it will be necessary to simplify the subject and to omit detail seen in both the strong light and the deep shadow. This

simplifying is often advisable when not necessary, as the aim of the artist should be to represent only what will best express and is essential to the sentiment of the subject.

Simplifying the most difficult art. — Art students have the idea that omission of detail is essential to the best work, and so think that good work will result simply from the omission of detail. They do not understand that the artist always has the sentiment which he desires to express in his mind, influencing every stroke that he makes, and that it is this effort to secure the ideal whole which eliminates all not essential to it. The art student does not understand that he cannot work as the artist does until after studying as long as the artist has studied to obtain the power to see, to think, and to work artistically; that is, to see the beauty and the poetry in nature and to overlook blemishes or details not essential to the sentiment of the subject. This being the case, the beginner who thinks to improve his work by omitting detail has no guide and no end to accomplish, and his drawings are consequently without merit.

Simplifying follows exact drawing. — The student asks how much detail he shall represent, and often is inclined to feel that he is imposed upon if requested to represent all or nearly all that he sees. But he ought not to feel satisfied until he can represent truly and readily all that he sees. To do this requires, in the first place, the capacity for seeing form and values truly, and, secondly, the power to draw. If the student can see and draw, it is simply a question of patient work to finish the drawing. If he cannot see or draw truly, he certainly needs the study which will enable him to do this, and which is to be obtained only by studying detail until it can be correctly represented. When the student is able to draw correctly and readily, then and then only will he be able to express artistically whatever he may feel.

Fine perceptions due to long study. — The power to feel and to see the finer effects of form and color can be acquired only by long-continued hard work and study; it cannot be imparted by one who possesses it to one who does not possess it. Consequently there is no easy road for the student who would become an artist. All must win whatever success they attain at the cost of repeated failures and much hard work.

Students are too apt to think that fame is due to genius which is the birthright of nature's favorites. Genius has been defined as the capacity for hard work, and the art student will do well to accept this definition; for though we must admit that all are born with different powers, we must also acknowledge that those whose fame in art is greatest began to work while young, and kept on drawing and painting till they were in the prime of life before they produced their best work. The art student who hopes to achieve success without work expects to do what the most highly gifted and most famous artists have not been able to accomplish.

Detail subordinate to mass. — The student who is told to represent detail must remember that no part should be exaggerated so as to interfere with the effect of the masses of light and dark. These masses must be represented in their proper relations even if, in order to do this, some of the finer gradations are not given or are given less strongly than they are seen. For instance, in representing a white polished sphere, the contrast between the glitter point and the parts near it is quite marked; and if the sphere is in a group in which there is a very dark object, it may not be possible to represent the glitter point as strongly as it appears without getting the mass of the light of the sphere so dark that the dark object cannot be represented in its actual relations to the white sphere. In this case it is much better to express the relations between the masses of light and dark truly and merely suggest the glitter point on the sphere; indeed this must be done if the mass of the light of the sphere is to be light enough to express the effect of the sphere in contrast with the dark object.

The Artist's Aims.

The artist an impressionist. — By means of paint, crayon, or any other medium we cannot reproduce any object, but can only produce what may create a more or less satisfactory impression of it. The artist should always aim to produce the strongest effect of his subject that can be produced by the medium chosen; he must be called an *impressionist*, whatever his style of painting or methods of work. As such he may seek to convey ideas of beauty of form or of color, but his first aim must be to produce the strongest impression of the

spirit of the subject, that is, of the impression it creates upon himself. It is not his aim to represent it as any other person may see it, or as the camera would reproduce it with all its unimportant details.

Sentiment more important than truth. — Art does not require exactness of representation, but rather the embodiment of the sentiment of the subject; this being so, we can understand why the artist disregards exact appearances, and that the best impression of the form of any object is often given by a drawing which is not like the image created by the object in the eye. We can also understand why the artist who works in light and shade may not give exactly the values he sees; and why in color work his aim is often not so much to give just the colors he sees as colors which may create in the eyes of those who observe the picture the same sentiments concerning the color effect of the subject as the artist felt when he was before it. To awaken these ideas, he often does not paint what he sees, because a much stronger impression of the color effect is produced by the contrast of colors which are different from those he sees. The artist is justified in departing from nature as regards either form, values, or color, when by so doing the result more truly gives the sentiment of the subject.

That a drawing is often improved by making the spirit of the subject more important than exact representation of details is shown by the drawings on page 71 of "Free-Hand Drawing," where Figs. 24 and 26 represent the actual appearance of the side boxes and Fig. 27 shows that when these boxes are to be shown by one drawing, it is better not to give the actual appearance of the side boxes, but to show instead the fact that the boxes are arranged in a straight line.

The difference between absolute truth of detail and the artist's drawing is shown by Figs. 22, 23, 24, and 25. The photograph gives the actual facts, and the three drawings give the facts most important to suggest the spirit of the subject. These drawings are not like the photograph as regards either the principal lines or the detail. Thus the long lines of the bank are more curved than in nature and the details much simplified, being suggested instead of represented. The artist always works in this way whatever his subject, for he feels its spirit, its long lines and principal masses, and so represents them as to produce the effect of beauty which he feels. His work is not care-

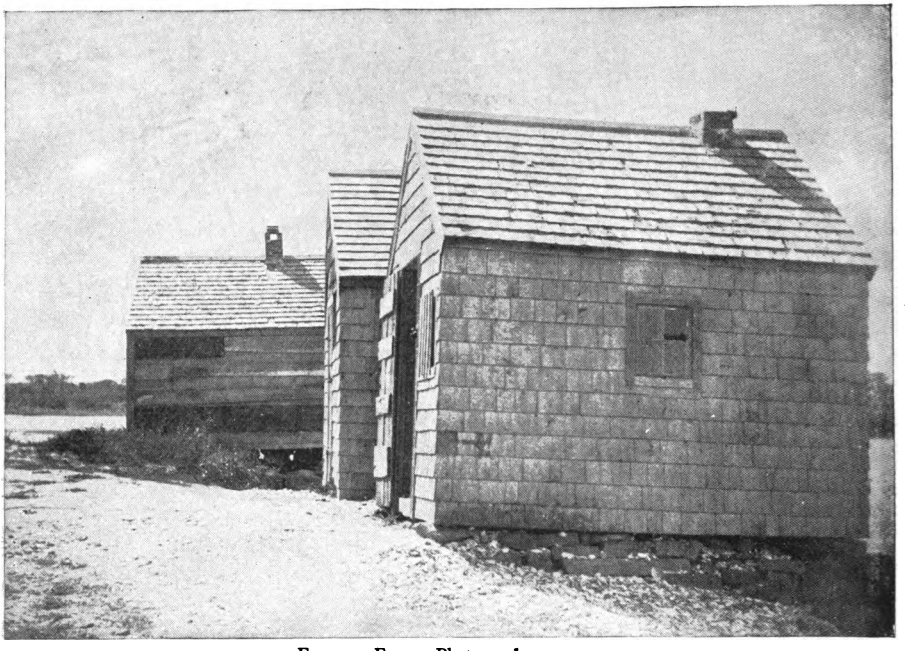


FIG. 22. From a Photograph.

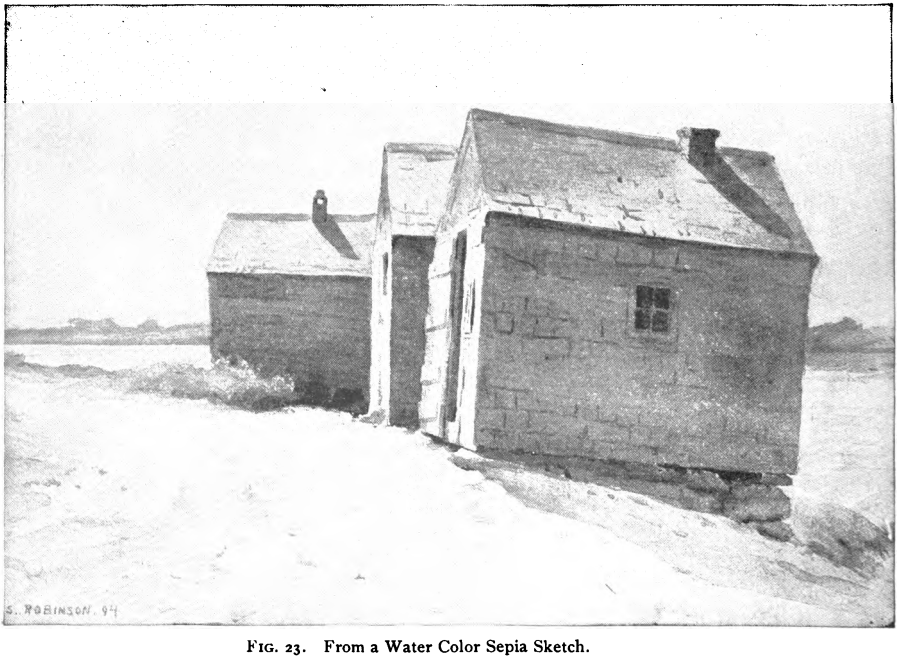


FIG. 23. From a Water Color Sepia Sketch.

FIG. 24. From a Pencil Drawing.

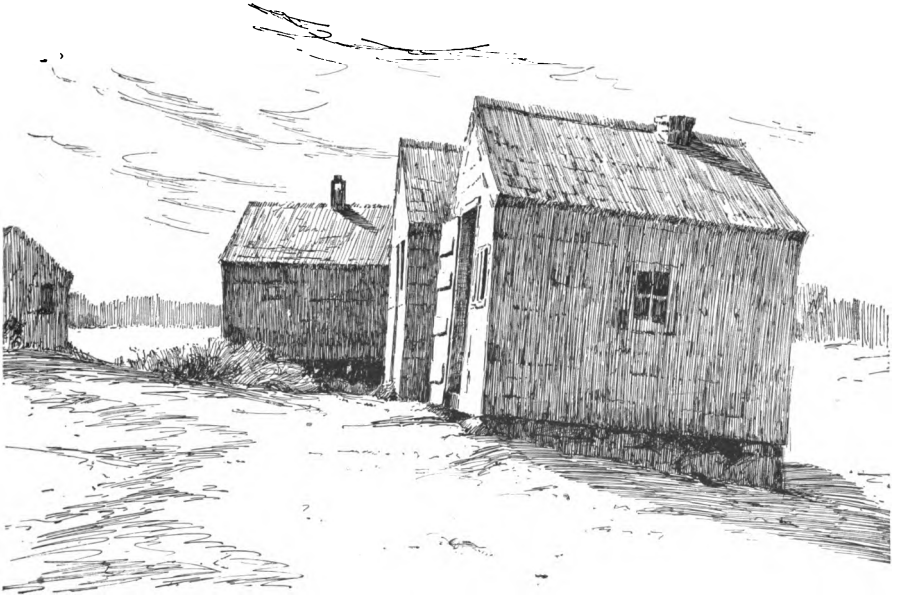


FIG. 25. From a Pen and Ink Drawing.

less or inaccurate drawing, but the best drawing of all the essentials. It differs from truth in order to produce the most truthful representation of the beauty the artist sees with his discriminating eyes, which do not dwell upon the ugly or commonplace features.

A true drawing of a near object unsatisfactory. — The student may be assisted to understand that the best drawing is due to feeling, and not to a literal representation of what the eye sees by studying photographs of figures in which he will often find unpleasant effects, due to the perspective of a hand or foot which is too near the camera to seem in harmony with the other parts of the figure. As illustrated in Chap. VII of "Free-Hand Drawing," the photograph is liable to distortions due to the camera not being pointed directly at the object. But the unpleasant photograph may be taken with the camera pointed directly at the figure and thus be nearly like the image of the eye; in this case its distortion is due principally to the nearness of the camera to the figure.

Artist draws by feeling. — If an artist draws just what he sees when very near a figure, the drawing resulting will be as unpleasant as the distorted photograph of a horse, for it disregards the fact that the artist should not be nearer the figure he draws than two or three times its height. If the artist is obliged to draw a figure when so near to it that representing the nearer parts of their actual visual proportions would make these parts seem too large for the farther parts, he changes the proportions until they represent those he feels concerning the figure and not the apparent visual proportions. When drawing out of doors he represents the proportions he feels and not those of the photograph, which often reduces and changes important lines very much.

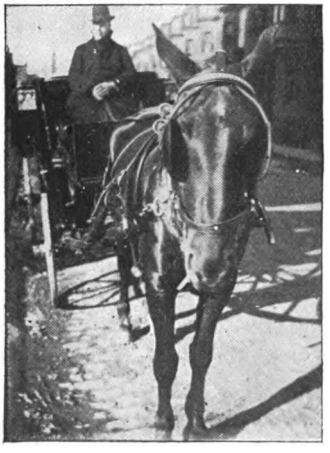


FIG. 25*a*. From Photograph.

The perspective of an object very near the eye is so large that when the eye is not at the station-point all the more distant objects

seem very small. The most distorted photograph will give a perfect impression of nature if it is seen from the proper station-point. Fold a card two inches from one edge, so that a right angle is formed. Then place the card above Fig. 25*a*, so that one part is parallel to the page and two inches from it; and twist a sharp lead pencil into the card to produce a hole about ⅛ of an inch in diameter, and opposite the center of the figure. When the picture is seen with the eye stationed at this hole, 2 inches from the page, it will not appear distorted. It is not wise to represent a figure or other object which is quite near the eye when other figures are far from it, for the correct visual proportions will produce a drawing which makes the distant figures appear as if dwarfs. Often a fence retreats into the picture from a point near the artist, and if its nearer parts are represented by their visual proportions, they will dwarf all other parts of the subject. In such cases the artist should change the proportions of the nearer parts so that they *feel* right.

Values are often changed. — In the matter of values the artist changes more frequently than in the form. Thus in a portrait it is important that the head be the principal feature, and to make it such the light upon other parts, the hand, for instance, is often represented very greatly subdued in tone so that it does not attract the eye; and always in all work the artist omits or subordinates features which are unpleasant or not essential to the sentiment which the subject creates.

The student cannot imitate the artist. — The art student cannot imitate the artist in work which is the result of feeling only to be obtained after years of study, and these explanations have been made in order that the student may be content to study until he can give truly just the form, values, and color seen before he attempts the most difficult problem in art.

CHAPTER IV.

TECHNIQUE AND METHODS.

TECHNIQUE.

Depends on individuality. — Little would be said upon this subject here if it were not for the fact that so much attention is often given to it that it is necessary to show that matters of technique are not of first importance. Technique or handling means the way in which any medium is used to produce an effect, and to the artist it is of great interest and importance, for upon the way in which the medium is handled depends the effect of the sketch and the time required to produce it. Handling is the result of temperament and education, and is very different with different people. The same subject may be represented by half a dozen different artists, and the handling of no two sketches be alike. The time spent upon them may range from a few hours to many days, and to the public the results may not be very different in effect, or, on the other hand, they may be so different that they would hardly be accepted as painted from the same subject.

Depends on education. — The average person rarely changes the habits and ideas which are his by birth and education. Almost every one has perfect faith in the theories which he holds, and often will not admit that the theories of others are worth consideration. On the contrary, he tries to convert those who differ from him, and sometimes he refuses to consider an opinion for which no authority is found in the school to which he belongs. If his mind questions the correctness of any point decided by his authorities, he is often too timid to let his doubt be known, and he thus sees and thinks through others.

We often recognize in the work of an artist the technique of the teacher with whom he has studied, and, if we know him, find that he sees no merit outside the work of his own school. The ability to be independent is possessed by the few who lead. Naturally the major-

ity seek some one to follow, or, rather, follow instinctively the leaders with whose temperaments they are in harmony. In art this causes the different schools, and gives rise to the conflicting ideas concerning art education.

Art judged by unimportant details. — The public generally is pleased by detail, the more detail the better, and it compares all work with that of a Meissonier or with a photograph. Some who have studied have passed beyond the stage of search for detail, but even to many of them art often consists principally of the technique of the picture, which is good if similar to that of the artists whose work they have chosen as ideals.

Art instruction influenced by fads. — The instruction in schools, both elementary and advanced, is too largely influenced by the latest technical fad, which is the technique of those who influence art matters at any particular time. So method supersedes method — there is no accepted standard, and art instruction often deals with matters relating to a medium and its handling, while the foundation of drawing and values receives far too little attention.

This is especially true of the work in the public schools, where it has often been necessary to have instruction in drawing given by teachers who have had little opportunity to study drawing. Consequently students have sometimes been told that all methods except one are out of date and harmful, and that drawings made in other ways are bad. For instance, it has been claimed that a charcoal or other light and shade drawing must be made wholly with the point of the charcoal or other pencil and consist of separate lines, and that a drawing in which the lines are at all blended to form a tint is not good. The results of such teaching are generally most mechanical drawings, although they are often better than some of the copies provided to show public school pupils how to make light and shade drawings.

Less important than truth. — Technique bears the same relation to drawing that style does to the study of the elements of language. Therefore the teacher of elementary work should not allow his pupils to consider technique at all. The pupil should think simply of the truth of the drawing, and the teacher of the way in which the pupil may obtain the truth most quickly and easily. The teacher should

remember that every medium may be used in many different ways, and should not restrict individuality of expression that produces true drawings.

The aim of a drawing is to create an impression of nature, and any drawing must be bad which, instead of doing this, causes one to think at once of paper and crayon or whatever other medium may be used, or of the way in which it is used. This is a good test for poor technique.

With any medium certain facts are self-evident, as, for instance, that the surface of the paper must not be destroyed by erasing; but such essential points will be discovered by any one who studies, and what is meant is that the spirit of the drawing should always be thought of first, and that difficult methods should not be studied because they are interesting to some noted person.

Concerns the advanced student. — The art student must be interested in technique, for it involves the mechanical points which he must master thoroughly before he can express himself freely; but questions of technique concern principally advanced students. The elementary student should be taught that the medium must not force itself or its handling upon the eye; that there must be in any drawing a harmony of treatment throughout its parts; that it will not do to finish one part perfectly and smoothly and have parts equally important imperfectly and roughly finished.

The ability and training of the student, and his aim in studying, must decide whether any medium or particular way of using it should be chosen; but the elementary teacher must consider simply how he can most quickly train his pupils to see and draw correctly, and he will discard any method which makes the pupil think of the point and the kind of line he is drawing instead of the form or value that should be represented.

Many ways of using every medium. — The pictures and drawings of the best artists should be studied, for the student will be greatly helped and inspired by them. Great variety of handling will be found in them and also in those by any one artist, and study of the technique of others will soon convince one that there are many ways in which any medium may be used with the best results, if one with artistic feeling can draw well.

Less important than beauty. — The public should be taught that the technique of a picture concerns them little, and that if a picture is beautiful in form, color, and sentiment, it should be admired for these qualities, and not because it is smoothly painted or roughly painted, or because it gives evidence of rapid work or of the greatest labor; for art does not consist in technique, but in results which come from and appeal to the soul, and are embodied in mind and not in medium or its handling. If this could be understood and the public would look beyond the surface of the canvas, a great advance would be made.

METHODS.

Harmony of methods. — In "Free-Hand Drawing" it is shown that the pupil who studies outline drawing should first suggest his impression of the mass of the group and of its important lines; that he should begin with its essentials and from the first express character by light touches suggesting the most important features; and that he should change these touches without erasing until finally the form is correctly represented.

There should be from first to last a harmony in the methods employed by the pupil, whatever the mediums used, and if the above is the best method for studying outline drawing, it must be the best for the study of light and shade. In practice the student who has thus studied outline will continue these methods, and the transition from outline to light and shade will naturally follow the making of outline drawings, for the touches required to obtain the correct form will often blend together and suggest the light and shade effects of the object.

Outline study leads to that of values. — To make a shaded drawing giving simply the relative values of a cast or a figure without the use of a background is a natural continuation of the process by which the outline should be obtained; for the trial lines follow the surface they represent and give the effect of shade as it is rendered by the pencil of the artist. The artist feels the surface he represents and expresses its form and gradations of shade by strokes which, following the surface, help to give the roundness and character of the part whose contour and value they represent.

FIG. 26. From Pencil Sketch by Raphael.

When a drawing such as Fig. 26 is to be carefully shaded, the masses of shadow should be carefully indicated and defined by light touches until all the contours and shadows are seen to be in correct

FIG. 27. From Pencil Study by Leonardo da Vinci.

drawing. The shadows may then be strengthened, the accents added, and the drawing finished as in Figs. 27 and 59. This natural process of making a light and shade drawing has been followed by the most famous artists of the past, and is an artistic method of studying form.

Many of the old masters' drawings illustrate this method and also

the fact that drawings with light and shade effects may be very conventional and far from representing truly all the values of the subject. They are drawings rather than paintings; that is, they are studies of form more than of values, and do not give either the relative values of the object alone or its values in comparison with its surroundings. The word "painting," as here used, means a drawing in which values and the effect are made of first importance; and in this sense a painting may be done in charcoal or the pencil as well as with the brush.

Use of background. — A drawing begun in this way may be carried as far as is desired; it may give all the values of the object alone, it may suggest a background, or it may give the full values of the object and its background.

A drawing such as Fig. 27 may be relieved by a background wherever the object appears lighter than the background. Without being strong enough to be a complete study of values, such a drawing may be interesting and true in expressing the character of the subject — its solidity and construction.

Light and shade drawings, carried on as explained above, give the very best practice in drawing, and whatever the aim of the pupil may be, he should work in this way part of the time, less time being required to study the relative values of the object or figure than is required to represent the object and its surroundings.

To study values. — The best method of studying when values are first in importance must now be considered. In this case it is most necessary to obtain the effect of the masses, and the student should begin by suggesting them. As quickly as possible the entire surface of the paper should be covered so as to lightly express the principal lights and darks. When the masses of dark have been suggested, the student should study form and construction until the masses are seen to be correctly indicated; then they should be strengthened, their details brought out, and the study finished by carefully representing all details just as in the case of the drawing (Fig. 27) which is a study of form and local values instead of a study of full values. But the student must not forget the impression of light and dark which the subject creates, and while perfecting the drawing, the greatest pains must be taken not to lose the values.

Drawing and painting. — In reality the student should be working in one of two directions without regard to the medium with which he

FIG. 28. From Charcoal Study by Sir Joshua Reynolds.

makes the light and shade drawing. He should be studying drawing or studying painting, — using the word "painting" in the sense that a representation of all the values causes one to think of the subject

simply and not of the medium employed, and in the sense that a drawing or picture is a work of art in proportion as it hides the medium employed and its handling.

To obtain the best results the art student must both draw and paint, and, even while working with black and white, he must use both methods. Frequently art students study drawing alone, and this accounts for the general disregard of values. Representing a cast or a figure with crayon or pencil upon white paper without the use of a background is study of drawing, and certainly cannot give the effect of the object, when the object is light against dark instead of dark against light. It is not surprising that pupils whose work has been largely of this nature should not be able to see the values in a simple group of still life.

The difference between a sketch and a study, and that between a study or drawing, and a painting (using painting in the sense of a drawing giving values), is shown by Figs. 26, 27, and 28.

Fig. 26 is by Raphael, and represents the Virgin and child. It shows the first light touches and the stronger ones by which the form was gradually obtained, and illustrates the fact that the artist works upon figure subjects just as the student was directed in "Free-Hand Drawing" to begin his study of the geometric solids.

Fig. 27 is from a pencil study by Leonardo da Vinci; it is a careful and true drawing as far as character and modelling are concerned, but it does not give the values, and is not a painting in the sense of representing light and color in addition to the form.

Fig. 28 is from a charcoal study by Sir Joshua Reynolds, and when compared with Fig. 27 illustrates the difference between a study of form simply, or a drawing, and a study of values which may be called a painting. Although done with charcoal, this drawing gives at first glance the effect of nature as regards light, color, and form, which it should be the aim of the painter to represent; and it is much more satisfactory as a painting than many colored paintings which are not true in values.

When the student is at work he should always have in mind the making of a sketch such as Fig. 26, or a study such as Fig. 27, or a painting such as Fig. 28, but he must not forget while working for

tone and values that Fig. 28 is as careful and as true in drawing as Fig. 27.

Painting method advisable. — The public school pupil should begin with pencil outline ; from this he should advance to light and shade work with the pencil, which may at first represent objects without a background ; but in the high school he should study values, and although pupils study drawing without intending to make a specialty of art, they should be taught to look at nature artistically so as to realize the effects of light and dark and color which she presents. To do this pupils must study values, and nearly all light and shade study in high and all elementary schools should represent the object and its surroundings in their true relations of light and dark.

Time-sketches. — Students so frequently forget the subject they are studying, while thinking of the medium or of unimportant details, that time-sketches are necessary if rapid progress is to be made ; and, regardless of the medium used, students of light and shade should be obliged frequently to make time-sketches in so short a time that they are compelled to work in the right way. If the time of the first sketches is limited to a few minutes each, pupils are obliged to look for the essentials, and to suggest them by light touches. If they mechanically try to produce finished results representing details their drawings are too incomplete and poor to satisfy themselves. Students who work mechanically and study details will, on comparing their work with the drawings of students who have worked properly, generally try to see effects, and to suggest them lightly and quickly.

The first time-sketches in light and shade may do little more than suggest the principal masses of light and dark. Students should understand, while making them, that their aim must be to represent what is seen as far as this is possible in the time, and to do this by telling the truth always, and never allowing any part of the drawing to be different in effect from the part it represents. Students often work carelessly, knowing that parts of the drawing are different from the parts they represent, but intending to change them later on. Such work produces drawings which are dark when they should be light, and which are very unsatisfactory and different from what the students know they ought to be.

A student should not begin to make a drawing until he has studied the subject and determined just what he has to do, in order to place no darks upon the drawing except to suggest corresponding darks of the object, and in order to avoid representing unimportant details either of light or of dark before the masses are correctly expressed. The spirit and the effect are the important things, and these should be thought of first and last; if this is not done the drawing must always be mechanical. The artistic method is that which at first lightly suggests the important features, and then, as they are found to be correct, strengthens them and accents the drawing, never allowing it to remain false in effect or values, so that whenever the student stops work the drawing is satisfactory and true as far as it has been carried.

Unsatisfactory methods. — Students are often allowed to draw an object or a group of objects by studying and finishing its parts in detail. As explained in "Free-hand Drawing," this method is very unsatisfactory, for no one has an eye perfect enough to obtain masses and proportions correctly by simply considering the details of the masses.

Another method is that of "blocking out," which considers curves as composed of straight lines, and curved surfaces as composed of many plane surfaces. The student will be assisted in making a correct drawing if, after having suggested the form, he studies it in detail to discover any tendency to angularity in parts which at first glance seem of regular curvature. But he will not be assisted in studying nature by any method which makes his drawings become false in any particular, or become mere illustrations of methods of working or teaching.

An illustration of the blocking-out method is given by Fig. 29. This drawing shows how students sometimes represent the masses of light and dark by two tones without gradation, and often separated by arbitrary straight lines, when in nature the gradation from light to shadow is quite gradual and not at all angular. Frequently many hours are spent upon drawings which are not carried beyond this conventional stage. Such work is intended to cause the student to realize that the effect of the object is due to opposed masses of light and shadow which are but slightly varied in tone and are often sharply

defined. But too often pupils fail to realize that this is their purpose, and consider them as serious studies. After having worked some time in determining arbitrary dividing lines of light and shade which they do not see, and which are so untrue as only to be suitable for the most conventional work in design, pupils then begin to make more finished drawings in the same way by blending with the stump the separation between light and dark determined as in Fig. 29. Drawings such as Fig. 29 are so different from nature that while at work upon the blended drawings all effect of the masses is often destroyed; and though, when rightly presented, good will result from the making of a few blocked-out drawings in two values and without gradation, students should never be allowed to spend much time on such drawings. A drawing of this nature should be made in a few minutes and should not be highly finished or considered as more than a conventional mode of expression which illustrates the fact that nature's effects are those of masses of light and of shadow in contrast. Students should never be allowed to use a medium in a way which suggests an attempt at light and shade effects but which does not represent nature well enough to give the impression of the roundness and particular solidity of the object.

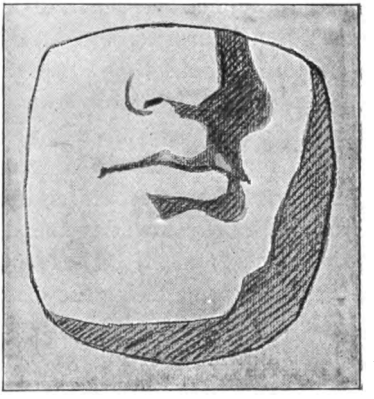


FIG. 29.

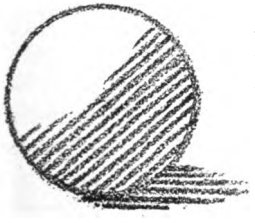


FIG. 30.

Line method. — Fig. 30 represents a method similar to that illustrated by Fig. 29, but which makes use of separate lines to produce the effect of shadow. As a representation of a sphere Fig. 30 is very unsatisfactory, for certainly, if unassisted in any way, no one would think of a sphere when looking at the illustration. But it is common for drawings to be finished in this way,

and copies which are even less satisfactory than Fig. 30 are often given to public school pupils in order to show them how to make light and shade drawings.

The origin of this method is probably found in the fact that the use of the stump tends to careless work on the part of the pupil, and also in the fact that separate lines can be reproduced by cheap processes. But as often taught, it illustrates the absurdity of attempting to formulate rules by which light and shade drawings may be made.

Center lines. — A common way of beginning is by drawing a center line about which parts may be symmetrically placed. Thus in Fig. 8 the axes of the cone and cylinder would be drawn before any parts of the contours, and in figure drawing a diagrammatic skeleton might be sketched by means of lines representing the center lines of the limbs and the body as in Fig. 31, or a variation of Fig. 31 might be made by suggesting the mass of the ribs and that of the pelvis.

Center lines are not usually seen, and those mentioned for the group, Fig. 8, and those of Fig. 31, serve simply to suggest the directions of the masses. The student who draws from nature will obtain the results given by the center lines much more satisfactorily by suggesting, instead of center lines which are invisible and which are often difficult to imagine, the principal contours of the parts; these are visible, no act of the imagination is required to determine them, and the light lines which suggest them are an aid in the completion of the drawing and often will remain in the final effect, while center lines, if drawn, must be erased.

FIG. 31.

When the student does not draw from nature, center lines will be of great assistance, and the student is advised to draw them. Much pleasure and profit will be derived from the designing of figure compositions in which the figures are represented as in Fig. 31, or by variations of this sketch; but when it is not necessary to depend upon the memory, unnecessary lines should not be drawn, and the progress of the drawing should depend not so much upon analysis of the construction as upon a feeling of the form which from the first leads to the expression of its essentials by means of the most important features actually seen.

Authority for all methods. — It is possible to find noted authorities for almost any view of any question, and in art the words or work of men who are or have been prominent are used in support of methods opposed to those of this book. The study of values, for instance, has been neglected in many of the schools of this country and Europe, and is given little attention even now in some quite noted ones. In some schools pupils are allowed to finish one part of a drawing before other parts are even suggested. Thus in a figure we find them painting the first day the head, the second the shoulders, and so on till on the last day of the pose they get to the feet or possibly not so far as this, the background being carried along with the figure. By such work it is almost impossible to obtain a harmonious whole, for the effect which any part will produce cannot be determined until it can be compared with all the other parts, and until the whole canvas is covered so as to give the desired effect. This principle applies as much to an outline or a light and shade drawing as to a color study. But even if the eye were trained to work correctly under such difficult conditions, it would be impossible to obtain harmony by correctly drawing what is before the eye at *different* times, for the light and shade and color effects of the subject are continually changing. Even in the studio the effects due to sunshine and a gray day are entirely different. Not only this, but during different hours of the same day the effects of color and light and shade are different, and it will be impossible to produce a satisfactory whole by simply representing what is seen when the pupil works upon and finishes the different parts.

Effect must be chosen. — The sentiment of the drawing and its effects of light and shade and color must be selected by the artist from the different changeable effects which the subject presents, and then he must work all the time with these desired effects in mind. To do this he must suggest as quickly as possible the desired effect when it is before him, and in all later work he must be careful not to lose or injure it. It is most important that both the student and the artist work for the spirit and the effect of the whole until it is correctly suggested; then the detail may be studied and the parts finished.

Public ideals often false. — Not only in values but in outline work is authority to be found for inartistic methods. Thus we are

told that a drawing should be finished bit by bit with firm, decided, and exact fine lines, or perhaps with soft gray lines drawn at one touch. It is not strange the public has come to regard the perfect circle drawn at first touch by Giotto as the symbol of the best art work, and to believe that perfection at first touch is not only desirable, but possible to obtain. We are told that there must be no variety of line in an outline drawing, and that in light and shade an exact and perfect outline should be secured, and then the light and shade placed within it. If instead of following the advice of any one author, artist, or teacher, each person should study for himself all the points involved, the adoption of inartistic methods would be far less general. Those who study for themselves will be led to ask why begin in light and shade work with an outline which often represents contours that are lost in the shadow, and which can no more express roundness than the circle suggests the light and shade upon the sphere.

CHAPTER V.

CHARCOAL DRAWING.

The Studio and Fittings.

The studio. — The studio should be a room not less than 20 feet square ; one that is 20 feet wide and 30 feet long, or larger, is desirable. It should have a large window facing, if possible, slightly east of north ; this direction should be determined by the North Star, as the compass points due north in very few places. The studio should be at the top of the building in order to avoid reflections from other buildings, and its walls should be very high. Rooms are seldom high enough for studios, and it is customary to extend their height by means of a skylight which faces north and has a window 6 or 8 feet high above the ceiling.

Studio light. — The length of the studio should extend east and west so that the principal window may face north and be in the center of a long side. The principal window should be about 10 feet wide, or wider, and extend from near the floor to the ceiling, where it should connect with that of the skylight whose angle should be about 70°. The roof of the skylight should be inclined and meet the ceiling at about the center of the room, or farther back if the ceiling is low. By means of the skylight the necessary height may be given to any part of a room which is to be converted into a studio. There should be no mullions or large framework to divide the window, which should extend unbroken from the top of the skylight nearly to the floor.

A room with simply a north window is very cheerless. If possible another window should be so placed that sunlight may enter the room ; it should be so curtained that the light may be completely excluded at will.

Curtains. — The principal window should be provided with two or three curtains arranged to draw up from the bottom, and another set should be secured at the top to draw downward. Thus light of any amount may be obtained from various directions.

It is often desirable, especially when light reflects from other buildings, to soften the light by a screen made of cheese cloth or other thin white material, which may be arranged in the form of a curtain to roll or to slide upon wires. A curtain of this kind will often give a fair light when placed at a south window, but the north window gives the only light suitable for artists or students.

School studios. — Such a studio is suitable for the artist and also for art classes, and when school buildings are designed, such special rooms should be planned for the drawing-rooms. When they are to be used for still-life work a shelf about 15 inches or 20 inches wide may be secured to the east wall about 22 inches from the floor, or shelves may be supported upon movable screens. Pupils should work most of the time with the light coming from above and at the left, but such a room will allow any arrangement of the group with reference to the light.

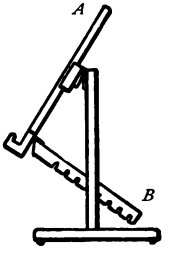


FIG. 32. A Side View.

The still-life studio should have a table for each student; its top should be about 10 inches wide and 30 inches long, and it should have a shelf or drawer for materials.

An easel similar to Fig. 32 is preferable to the table and no more expensive. The piece *A* should be but a few inches wide, and should support the shelf which should be adjustable vertically and supported at any angle by the arm *B*. This easel will require less floor space than a table, and has the advantage of not extending as other easels do above the drawing and so preventing students from seeing the group.

MATERIALS FOR CHARCOAL DRAWING.

Paper. — Paper for charcoal work must be of good quality and rough in texture. The Lalanne and Michelet papers are satisfactory and cost six cents per sheet. The Coquelin paper is heavier and generally most satisfactory; it costs eight cents per sheet.[1] Cheaper papers can be obtained but are not advisable, as even the best grades

[1] These and following retail prices are given to show the comparative expense of the materials. The prices will, of course, fluctuate.

named are often so uneven in quality that uniform tones cannot be obtained. All these papers have watermarks in the form of straight parallel lines about an inch apart, which are seen most plainly when the sheets are held toward the light. When thus held the water-marked name of the paper is seen, and the side from which it is read is the right side of the paper and should always be used. The sheets are of uniform size about 19 inches by 25 inches. Whatman's cold-pressed paper may be used, but no paper is as satisfactory as the regular charcoal papers named.

Charcoal. — There are many grades of charcoal of which only the best should be used, for with cheap grades, which are often gritty or brown, good results cannot be obtained. Good charcoal should give a perfectly black, smooth tint when rubbed into the paper with the finger. Every stick should be tried upon the edge of the paper in this way before it is used, and if it is gritty or uneven in texture or gives a brown tone, it should be broken and thrown away. When the sticks consist of round twigs the central part of a stick is often soft and brown while the outer parts are black ; care must be taken to avoid using sticks not black throughout.

The charcoal made in France by Conté of split twigs and called *Fusains Vénetien* is very satisfactory. It is packed in boxes holding 50 sticks and costs about 45 cents a box.

Extra hard charcoal in boxes holding 50 sticks, costing about 55 cents per box and labelled *Fusains Vénetien Extra Dur*, is prepared by Berville. The student will do well to obtain a box of this grade and, if necessary, a few sticks of a softer grade such as that first named.

Boards. — The surface of a drawing board is unyielding and unsatisfactory to work upon for the grain of the wood and all irregularities of its surface indent the paper and injure the drawing. Instead of a drawing board, a canvas the size of the sheet of charcoal paper on which the drawing is made should be used, and the paper secured upon it by thumb tacks. Its yielding surface will help greatly to produce an artistic drawing.

A portfolio may also be used as a board, and the paper secured to it by thumb clips, but it is not as satisfactory as the canvas.

Paper may be stretched upon cloth secured to a stretcher or it may be stretched upon the frame without the cloth. When the drawing

is completed it is then ready to be framed. It is best that paper upon a stretcher should have the protection of the cloth or canvas backing.

Crayons. — Crayons are sometimes used in finishing a charcoal drawing, as they are harder and more easily kept sharp. They give a deeper black than charcoal, but it is of a different nature, and the student is advised to work wholly with the charcoal or wholly with the crayon.

Conté crayons in pencil form cost eight cents each, and come in five numbers, of which No. 2 is suitable for most work.

Conté crayons in stick form about 2 inches long cost 18 cents a dozen and come in three grades.

As crayon cannot be readily changed or erased, it is therefore a medium for the artist, and not suitable for the student.

Crayon sauce. — Conté crayon sauce comes in rolls about ½ inch in diameter and 2 inches long, costing six cents each. This sauce is applied with a stump, and although sometimes used in connection with charcoal, there is the same objection to its use as to the crayon pencil.

Stumps. — A charcoal drawing may be made wholly with the point of the charcoal and without any blending or rubbing of the tones ; or it may consist of tones produced by rubbing the charcoal into the paper with a stump. Both methods of work have been and are taught, and there are teachers who think that a drawing can be made in only one of these ways.

The objection to the use of the stump is that students seem to think the stump will make the drawing if it is applied vigorously to the paper; and as a result the surface of the paper is quickly destroyed by the stump so that no amount of work can produce a satisfactory drawing. When the point of the charcoal is used without the stump, the student is more likely to think of form. But to secure the best drawings it is not necessary that a drawing be made wholly by use of the point, and the best method is that which confines the pupil to no one way of working, but allows him to secure effects in the readiest ways.

Paper stumps. — These are made of gray paper in many sizes, and cost from 5 cents to 15 cents each ; they are intended to be used for producing even tones by blending the tones given by the

charcoal point. If thus used they should be very lightly applied to the paper, for if any pressure is applied they will quickly destroy its surface.

Leather stumps. — Leather stumps of chamois skin are made in many sizes, and cost from 6 cents to 40 cents each; they are intended to be used to produce even tones by rubbing crayon sauce upon paper, and are necessary when this medium is chosen.

If pressure is applied when any stump is thus used it will quickly spoil the paper, and the student is advised not to use a stump for rubbing the charcoal, and also not to use crayon sauce, which necessitates the use of the stump for this purpose.

Any blending required in a charcoal drawing is best given by rubbing lightly with the finger the tint placed upon the paper, taking care that the finger is not moist from perspiration. The stump is most valuable not for its intended purpose, but used as an eraser. A clean stump will lift the charcoal from a place too small to allow the finger to be used upon it and will prove very valuable; it may be cleaned by pressing and twisting it into bread.

Tortillon stumps. — These are small stumps about 3 inches long and ⅛ of an inch diameter, and cost ten cents per dozen. They may be made by tightly rolling charcoal paper into the form of a sharp-pointed pencil. They are very valuable, as they may be used as an eraser for picking out small lights and for refining and softening sharp edges, and in fact for any drawing where a part is to be lightened instead of darkened. Various means of erasing are described as follows.

The finger. — When it is required to soften or lighten masses or any details not too small, the finger is the best eraser, but it cannot be used to obtain a very light detail within a mass of dark. The finger may be cleaned by rubbing it upon cloth or, better still, upon bread.

The breath. — A large surface may be lightened quite quickly and uniformly, especially when the drawing is in its first stages, by blowing strongly upon it; and a small part may be lightened by blowing upon it through a tube, which may be readily obtained by rolling a sheet of paper.

Bread. — Fresh bread made without lard or other oily substance is the eraser most satisfactory and generally used in charcoal work,

as it will quickly remove the charcoal from the paper without the slightest injury to its surface. It may be rolled into pointed stump-like pieces, by which small lights may be taken out, and it is preferable to a sharp-pointed eraser because it does not indent the paper and because it produces a light which is not too keen-edged for artistic drawings.

Rapping. — Any dark may be lightened by rapping the paper with a pencil or other hard object so that the particles of charcoal are set in motion and caused to fall from the paper.

Faber's pencil eraser. — This eraser is made in the form of a lead pencil, and is the best form of rubber eraser for light and shade work, as the wood keeps the rubber from becoming soiled and makes it convenient to draw with. If the paper is worked upon so long that bread will not remove the dark from any part which should be light, it may be necessary to use a rubber pencil eraser.

Nigrivorine. — This is a sharp-pointed rubber ink-eraser; by giving it a thin wedge-shaped point it may be used to produce a narrow light when the paper has been worked upon so long that the bread will not lighten it sufficiently. It should be used with care so as not to indent the paper, and only when the bread or kneaded eraser will not answer.

The artist may sometimes use in place of this eraser a sharp knife, with which the lights are scratched out, but pupils should not be advised or allowed to use the knife, which at best does not improve the drawing. It requires much skill to use a knife without spoiling a drawing.

Faber's kneaded eraser. — This is an eraser consisting of rubber which may be worked into any form as if it were a piece of bread; it is soft, pliable, does not injure the paper, and resembles bread so much in its results that it may be used in its place, thus avoiding the dirt occasioned by the use of bread.

Cloth and chamois skin. — A common cloth or chamois skin may be used as an eraser, but the student is advised to use the means previously explained in preference, as these force the charcoal into the grain of the paper so thoroughly that unless the surface is afterwards worked over with the charcoal point there is not enough variety of tone, and consequently the drawing lacks atmosphere.

Fixatif. — The tones of a charcoal drawing consist of fine black powder, which, as has been explained, is readily shifted about or removed from the surface of the paper, and in order to preserve the sketch it must be fixed or varnished when it is completed, with a liquid called fixatif.

Good fixatif should be very light-colored, and should dry upon the hand so as to be quite adhesive just before it is dry, but it should leave no powder upon the hand. Inferior grades of fixatif are often sold, of which several times the quantity that should be required may be used without fixing a drawing, but often producing a surface of powder upon the drawing, which spoils it.

Fixatif may be made by adding to a pint of the best alcohol about 4 ounces of the white shellac liquid varnish, and allowing it to stand until the upper part becomes a clear amber color, when this clear part may be poured into another bottle. The fixatif may be used before it has settled, but upon the best drawings only the clear fixatif should be used. There should not be enough shellac in the fixatif to cause it to be very sticky, for this will make the drawing shine and will spoil it.

Fixing the drawing. — Any common atomizer will serve to spray the fixatif upon the drawing, but those with fine tubes will be clogged with the gum if they are not cleaned with alcohol each time they are used. The best atomizer is one made of two large folding tin tubes and costing 25 cents.

The atomizer may be used to spray the fixatif upon the drawing, or the fixatif may be applied to the back of the drawing with a brush. To use the atomizer the drawing should be placed horizontally upon a table. The atomizer should be held far enough from the drawing so that no large drops will reach it, and the spray should be directed above it so that it falls gently upon the drawing. If the atomizer is near the drawing or the spray strikes it forcibly the charcoal will be moved about on the paper and the drawing will thus be spoiled. A little fixatif should be blown upon the drawing, which should then be allowed to dry, for if the surface of the paper becomes wet the drawing will be spoiled. When the lighter parts have been fixed so that the charcoal will not rub off upon the finger or cloth, a hole should be cut in a piece of paper so that fixatif may be blown through

it upon the darker parts without striking the lighter parts. No more fixatif should be applied to any part than is required to hold it, for the drawing will be spoiled if varnished so that it shines.

The charcoal is most apt to be blown or floated from its proper position in the first stages of fixing, so very little should then be applied without waiting for it to dry.

To apply fixatif with the brush, the drawing must be secured in a horizontal position, face downward, with nothing underneath it that may touch it. It may be tacked to any frame or stretcher, or opposite edges may be secured to wooden strips. Care must be taken not to rub the drawing while thus securing it. The fixatif should be applied to the back of the drawing with a brush about 3 inches wide. The drawing will thus be fixed without danger of injury by drops or by making the drawing shine. The paper should remain horizontal until thoroughly dry. Fixatif applied to the back should be stronger than that which should be used upon the front of the drawing.

Making a Charcoal Drawing.

First directions. — The first work in charcoal should be the quick sketching of simple groups of still life composed of objects of different colors; but if students have not had sufficient practice to enable them to draw in outline correctly, they may work from single objects, testing their values, as explained in this book, and the drawing, as explained in "Free-Hand Drawing."

These time-sketches should be upon half-sheets of charcoal paper, and not even the youngest pupils should use paper smaller than a quarter-sheet, for charcoal is not suited to small drawings.

It is impossible for the student to realize the effect of his drawing if it is not held as far as possible from him and at right angles to the direction in which he looks upon it; and while drawing, the arm should always be outstretched, for if much bent, it will be so cramped that free work cannot be done, and it will also cause the eyes to be too near the drawing. Even at arm's length the student will fail to realize the errors of the drawing, and he should remember to place it beside the group often and study both from a distance.

The hand or sleeve should not be allowed to rest upon the paper, for this will spoil its surface, and if the sleeve or hand rest upon the drawing, it will be erased. If the hand cannot be held steadily enough to obtain the fine details, it may be rested upon a ruler or other form of mahl-stick held in the left hand so as to rest against the right-hand edge of the sketcher.

The student who has studied outline drawing for some time before beginning light and shade will be able to plan and place his drawing to good advantage upon the paper without blocking in its principal proportions by light touches connecting the prominent corners in its contour; but those who are not able to do this may suggest the space the drawing is to occupy by very light charcoal touches, forming the blocking-in lines illustrated on page 11 of "Free-Hand Drawing." The height and width may then be measured and changed if necessary, and then within the space thus obtained the student may work as directed. Students are advised, however, not to draw these lines, but to simply think of them while blocking in the masses of dark which take the place of the lines and determine the proportions of the group.

Great care must be taken that students do not work upon the objects one at a time, drawing an object, then its shadow, and then its surroundings. This mechanical work can be avoided only by insisting upon any shadow and its adjoining cast shadow being put in of uniform value at once, and all such masses in the group being thus suggested in a time so short as to forbid study of details in these masses.

Before beginning to draw, the pupil should nearly close his eyes or in some other way blur his vision, so as to see simply the effect of the group, — its masses of light and dark. He should study the masses of dark long enough to decide their forms, positions, and relations, and should then begin his drawing by lightly suggesting the darks and as quickly as possible placing upon the paper tints which represent the masses of dark, without regard to whether they are produced by dark local color or by shadows with their adjoining cast shadows. He should use a piece of charcoal of medium grade, of perfectly smooth quality, and of pure black color, and he should not sharpen it, but with its side should place wide tints adjoining each other and producing tones as nearly uniform as possible. The

FIG. 33. From Charcoal Sketch — Time, ¼ Hour.

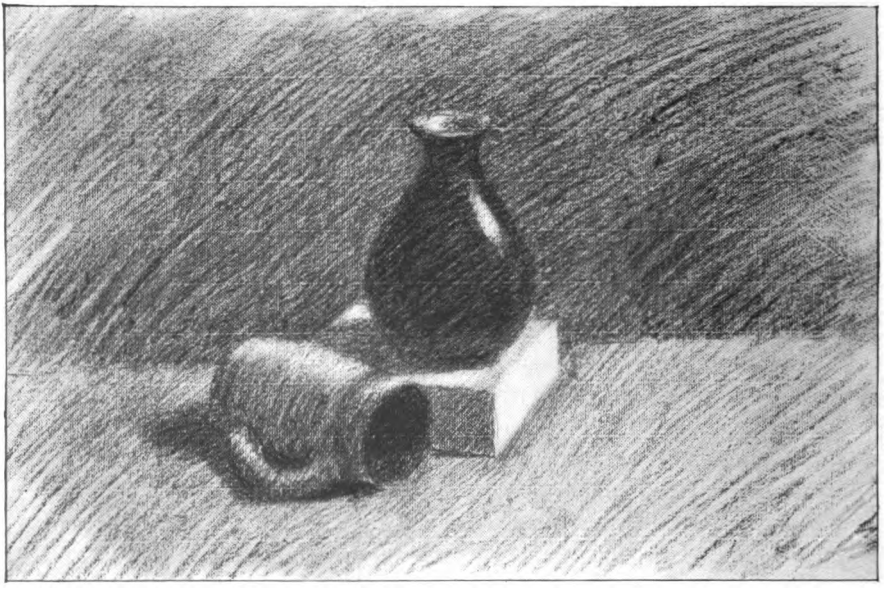


FIG. 34. From Charcoal Sketch — Time, ½ Hour.

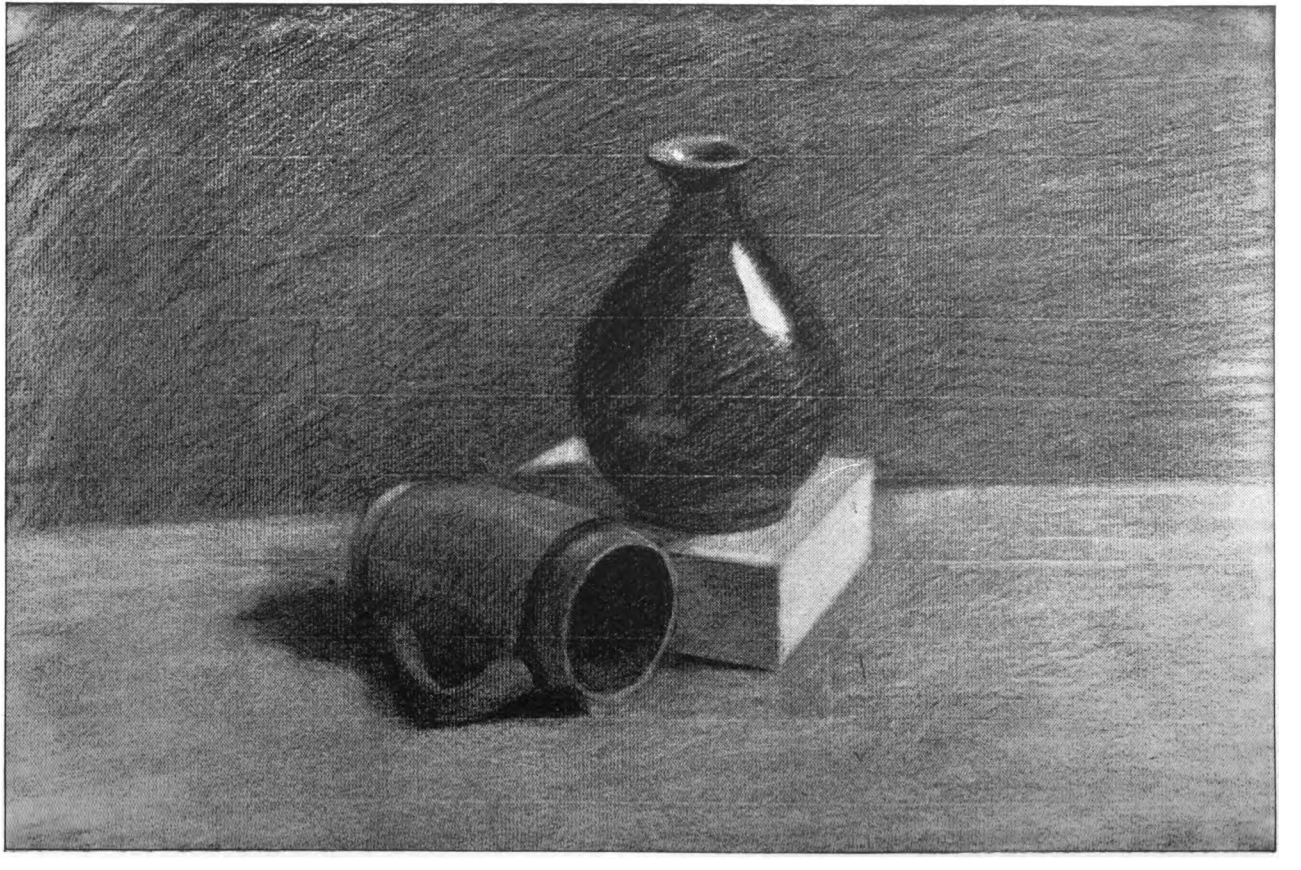


FIG. 35. From Charcoal Sketch — Time, 2 Hours.

charcoal should be passed regularly and rapidly along the surface, producing a tint by both the upward stroke and the downward stroke. The direction of strokes throughout the entire drawing should be about the same, but the direction is of no importance as long as it is not unpleasantly noticeable in the effect. The masses may be laid in by using a short stub of charcoal placed flat on the paper.

The first stage. — The first stage of the drawing should consist of hatchings, suggesting the masses of dark more lightly than in Fig. 33, and not bounded by outlines. Thus in Fig. 33 the dark masses are those of the dark vase and its cast shadow, the shadow and cast shadow of the mug, and the shadow of the plinth. The student should not spend over five minutes in suggesting these masses, and should not separate the cast shadows from the shadows. When these masses are lightly suggested, their proportions may be tested by measuring the height and width of the whole group; and if not correct the proportions should be changed, increasing the strength of the tones as this is done.

The second stage. — The second stage of the drawing is shown by Fig. 33, and is obtained by putting in the background and strengthening the darks to bring out the cast shadows. The student should not draw outlines or determine contours except as they come from gradually developing the forms of the masses of the different values. In doing this the charcoal should be carried over the objects across the contours and the background as often as possible, in order that sharp outlines may not destroy the effect of atmosphere, which comes from the contrast of tones only. The student should be able to produce the second stage of the rendering of a simple subject, such as Fig. 35, in not over fifteen minutes, for if he works slowly, he will be thinking of outlines and details instead of effects and masses; and if he begins thus, he will continue to work mechanically for the unimportant, without obtaining the essentials. Students have been so generally taught to make an outline drawing before beginning to shade that many find it very difficult not to think about outlines; but if they do not force themselves to cover the paper so as to suggest the principal masses, as in Fig. 33, in a few minutes, they will never be able to forget outlines and work freely and artistically.

The third stage. — When the masses have been given, as in Fig. 33, all tests needed to prove form and proportions to be correct should be applied, and any corrections required should be made not by drawing outlines, but by shifting the tones and gradually strengthening them until the general effect becomes as strong as is necessary. The more important details should then be suggested, and the third stage, represented by Fig. 34, results. If the form must be changed by lifting a dark tone, bread may be used ; in this way the glitter light on the vase was obtained and some of the background tone removed to give the light face of the plinth. Rapid time-sketches should be made until students can give the effect of a simple group with as much detail as Fig. 34 represents, in not over half or three-quarters of an hour ; when able to do this, they should learn how to carry the drawing farther, as shown by Fig. 35.

Blending. — In Figs. 33 and 34 the charcoal is simply hatched upon the paper, no blending being given by the stump or the finger, but tones as atmospheric as possible being obtained directly by the use of the stick of charcoal. But if any part of such a drawing is worked upon with the finger or in any other way so that the grain of the paper is thoroughly filled, the blending thus produced will make the rough texture found elsewhere in the drawing unpleasant, and so necessitate an equal amount of finish in all other equally important parts of the drawing.

Any drawing which is to represent much detail will require that the grain of the paper, which is not filled when a time-sketch such as Fig. 34 is made, be filled by working over the entire surface of the paper. This may be done when the paper is not very rough by using the fine point of the charcoal to fill in all parts not touched in the first use of the charcoal; but this method is very slow and unsatisfactory, for the parts which require the most study and the use of the eraser will have a different texture from the other parts of the drawing. When a drawing is to be carried farther than Fig. 34, the best way is to fill in the grain of the paper after the drawing is in the state illustrated by Fig. 33 by going over all the surface of the paper with the finger used lightly as a stump, applying just pressure enough to work the charcoal into all the depressions of the paper. If the finger is moist, it

should first be dried by rubbing it upon charcoal hatched near the edge of the paper.

It is especially important that the finger be passed over all the contours of the objects, for if the grain of the paper is not worked upon at the contours as much as elsewhere, an atmospheric effect cannot be produced. The student must not draw outlines in any stage of a light and shade drawing, or positively place contours until the very end. Then he will not be afraid of losing outlines or of going over the contours as they are suggested in Fig. 34.

The student must not omit to work over the entire surface of the paper, even that of the lightest parts; thus the side of the plinth or of any lighter object, supposing such to be in the group, must receive a light tint and as much rubbing as any other part, for the lightest surfaces have gradation upon them, and an atmospheric drawing cannot be made if the grain of the paper upon these parts is not worked upon as much as elsewhere.

It may often be necessary to place a tint upon a light surface and then remove it, in whole or in part, in order to destroy the grain of the paper and produce a tint as light as is desired.

Finishing the drawing. — When the grain of the paper has thus been equally worked upon and thoroughly filled throughout, the student may work upon the resulting tones with the point of the charcoal and with that of the tortillon or rolled bread or kneaded eraser, drawing details and perfecting values. It will not be necessary for further rubbing to be done, or the finger or stump used except as an eraser to lighten parts made too dark.

In thus finishing the drawing a long piece of hard charcoal should be used which is sharpened to a wedge-shaped point, similar in form to that of a pencil used for mechanical drawing, in order that the point may wear longer than a conical point. It must be sharpened upon sandpaper or a file. A short piece of charcoal should be placed in a crayon holder.

The student must aim to use the charcoal point so as to obtain just the right form and value for every part, and he should use the point of the tortillon or other eraser to obtain narrow lights. By means of these different points he should carefully work all detail into place upon the foundation given by rubbing with the finger the drawing illustrated by Fig 34.

No sharp contours. — There must be no very sharp edge or keen separations in the drawing. This is very difficult for students to realize; often they wish to lay a straight-edged piece of paper down along the edges of a plinth, for instance, and then use the eraser along the paper to produce a straight-edged contour. If properly taught that a free-hand outline drawing must be made entirely free-hand and so that its lines do not resemble those given by the use of a straight edge, they would not expect to make a good light and shade drawing in such a way; for they would understand that no mechanical aid nor mechanical accuracy is permissible in an artistic representation of even the most geometric and exact object. An artistic drawing must have the variety in both line and tone which results from *free-hand* drawing upon a surface slightly yielding and not pefectly smooth. There must, however, be a definite representation or separation of such parts as the edges of the plinth and other objects.

If the sharp line given by using the eraser along the straight edge is slightly blended by using the tortillon stump, the effect will be improved, and if edges not quite straight which come from use of the charcoal point free-hand are too sharp (as often they will be), the point of the tortillon may be used to blend them slightly and thus give a separation which is decided and also soft enough to be artistic.

The student must remember that there are no outlines in nature, and that he cannot in light and shade artistically represent objects by outlining them either with dark or with light. The only parts where there should be the effect of a line are the parts which represent very narrow shadows or very narrow lights. Under the plinth in Fig. 17 is a shadow which gives the effect of a line and which must be represented, and so must all similar details of dark or of light; but no object is completely or even largely outlined by such effects, and no work of art true to nature can be outlined, for outlines are pure conventions. Hence the student should not begin a light and shade drawing by outlines for they will be worked out of the effect with difficulty. In no part must the contours be defined by keen-edged tones, and the tortillon stump must always be used to soften all separations that have become too sharp.

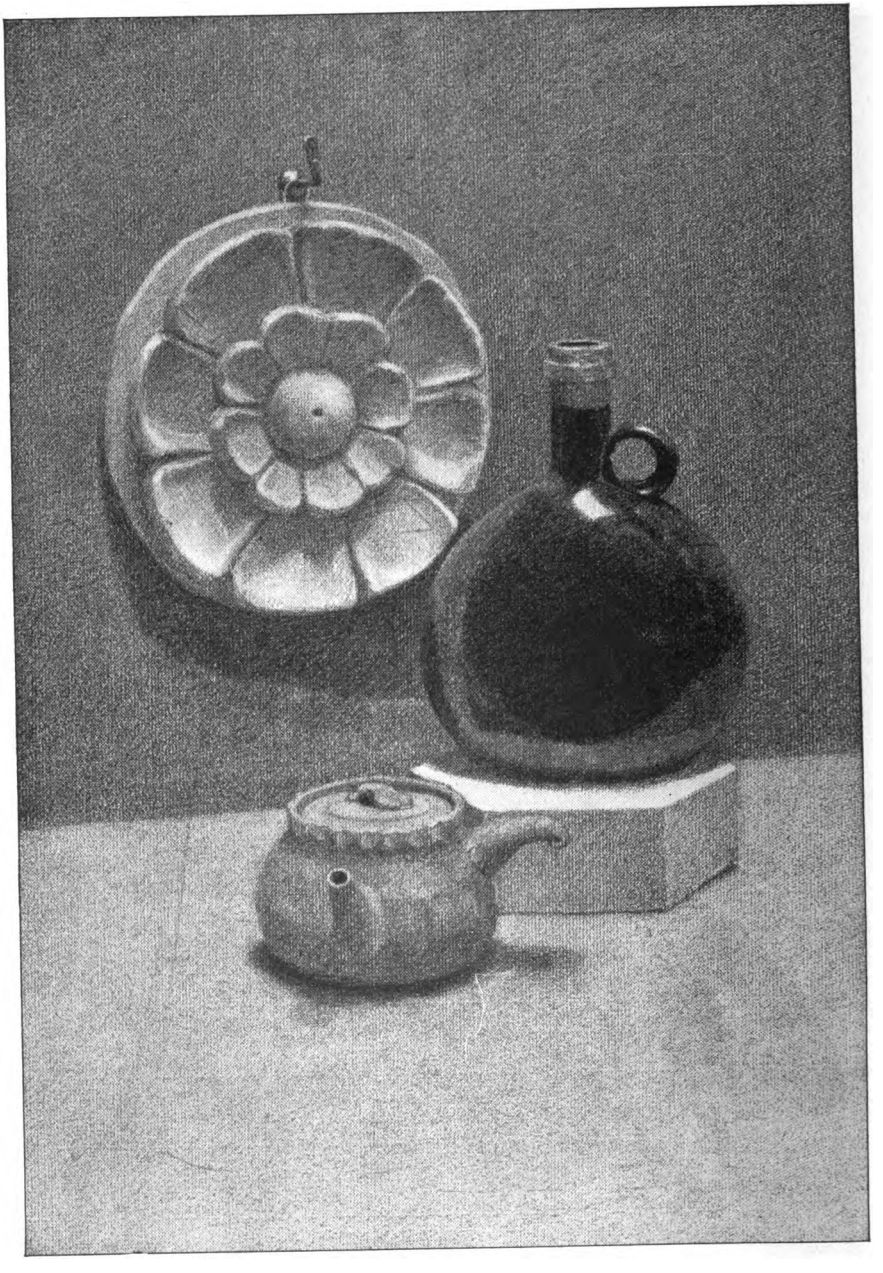


FIG. 36. From Charcoal Study.

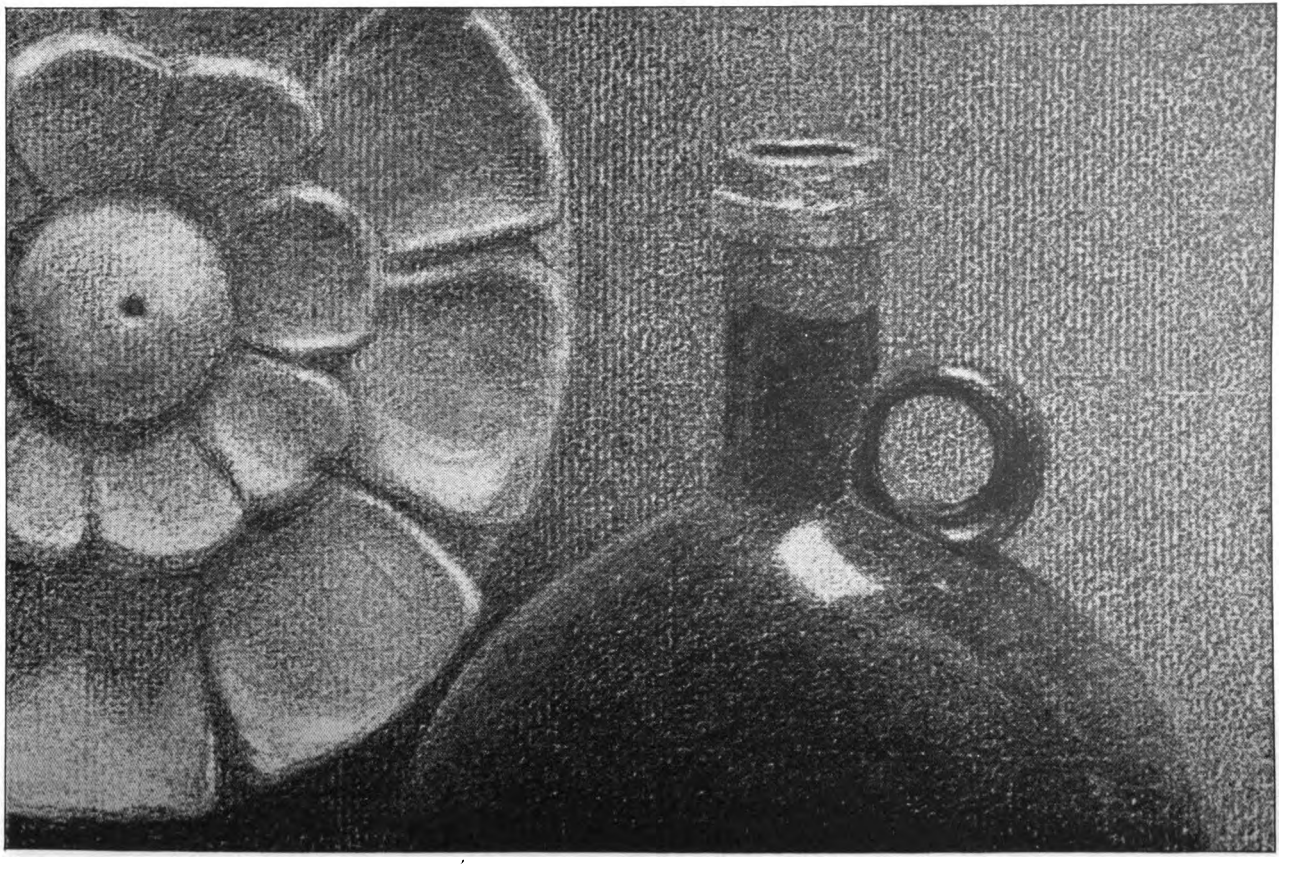


FIG. 37. From Part of Opposite Study — Full Size.

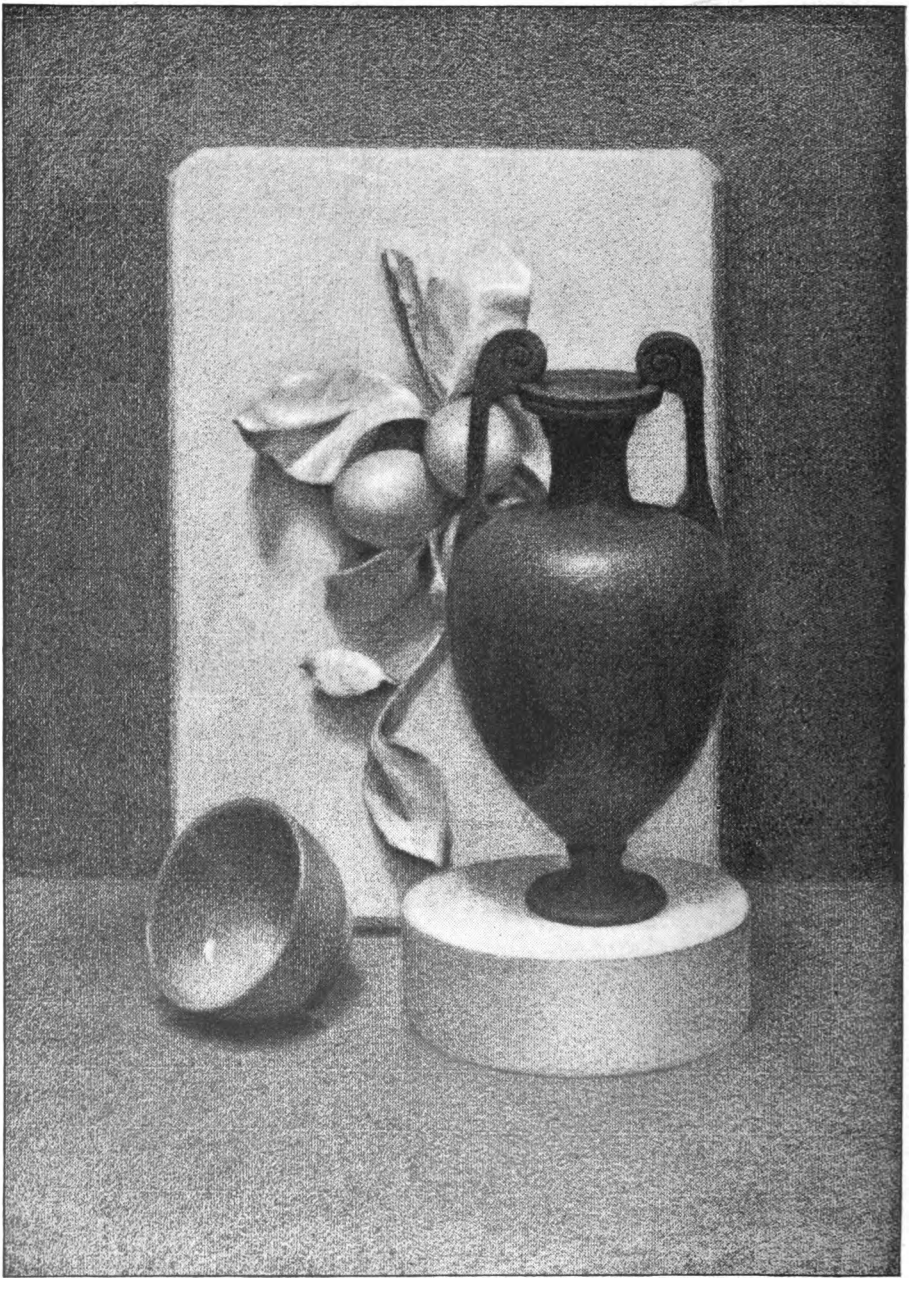


FIG. 38. From Charcoal Study.

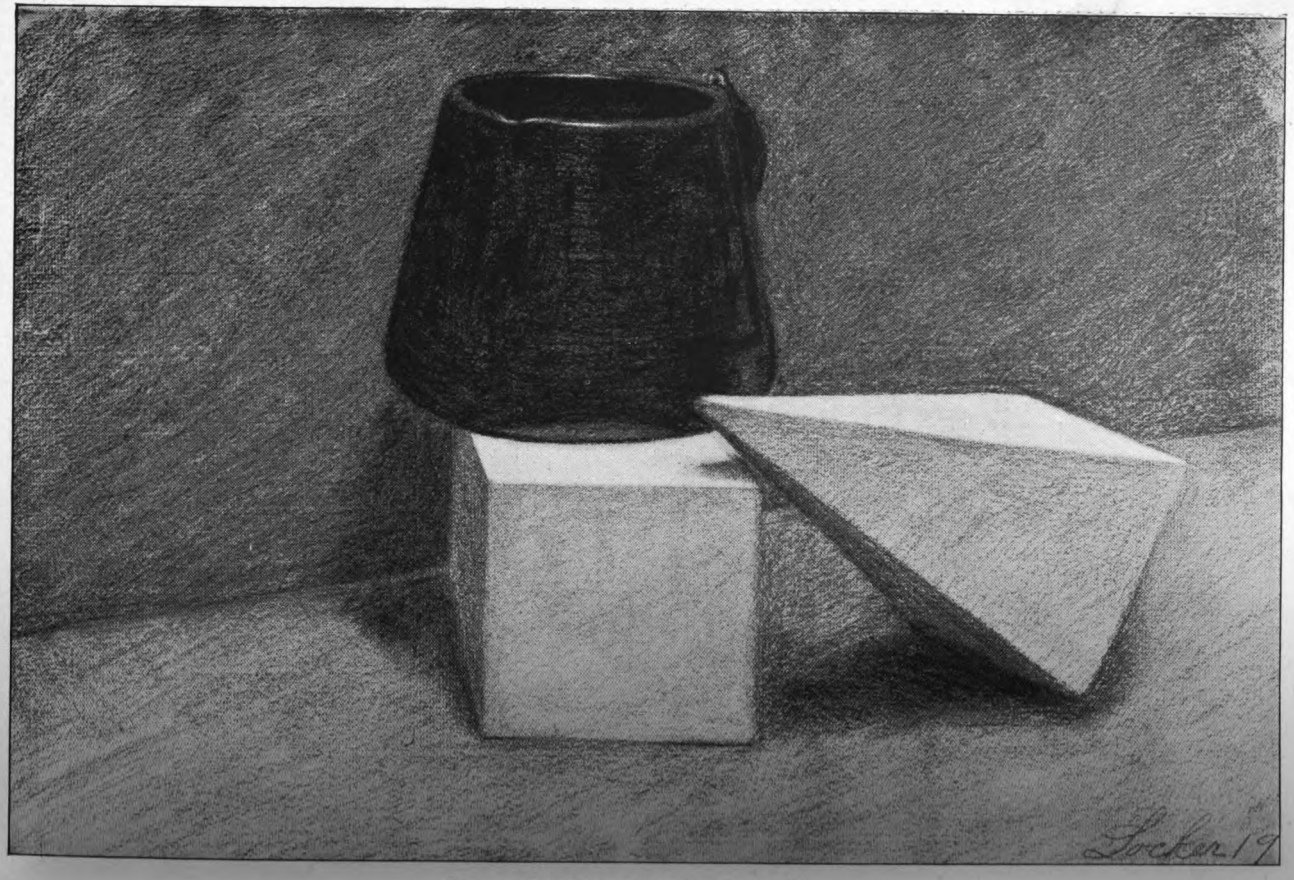


FIG. 39. From Charcoal Sketch — Time, 2 Hours.

Variety necessary. — There must be variety in all drawings, and so in charcoal work in some parts the contours must be more sharply drawn than in others; these are the parts which are accented by keen lights, strong shadows, and by strong contrasts, and they must be more prominent than the contours which are more or less lost in the masses of light or the masses of shadow. These sharper parts of the drawing are its accents, but they will not be noticed if all parts are made quite sharp. It will not do to have contours uniformly sharp even if they are not very keen, for this will produce a hard and mechanical effect. On the other hand, it will not do to have all contours and definitions uniformly soft, for this will produce an unpleasant and characterless effect.

The photographs may assist the student to understand the above remarks. Fig. 14 represents contours and details by almost uniform sharpness, and is far less pleasing than Fig. 20, in which the contours are decided in parts and almost lost in other parts. These figures illustrate the fact that a photograph as well as a drawing may be mechanical and hard through uniform sharpness of definition, or may be pleasing and artistic through variety of definition and subordination of detail.

The background subordinate. — In any study the lines or details of the background or other unimportant parts should not be made as prominent as in Fig. 14, but should be suggested as slightly as in Fig. 20, or omitted altogether, in order that the time may be spent in study of the detail of the objects which form the group and are important.

The illustrations. — Fig. 36 is from a charcoal drawing upon which several days were spent. The light was directly overhead, and the plaster rosette was very dark in color from age, so that the drawing seems dark; it is, however, quite true to nature in values.

Fig. 37 gives, full size, a part of the rosette and bottle of Fig 36, and shows the texture produced by working as explained. To produce the best effect of atmosphere the grain of the paper should show about as strongly as in this figure. It is not necessary to completely work out the watermarks of the parallel lines unless they come in parts where much fine detail is to be represented.

Figs. 35, 39, and 41 are from two-hour time-sketches by first-year art-school students; they illustrate the work which is of greatest

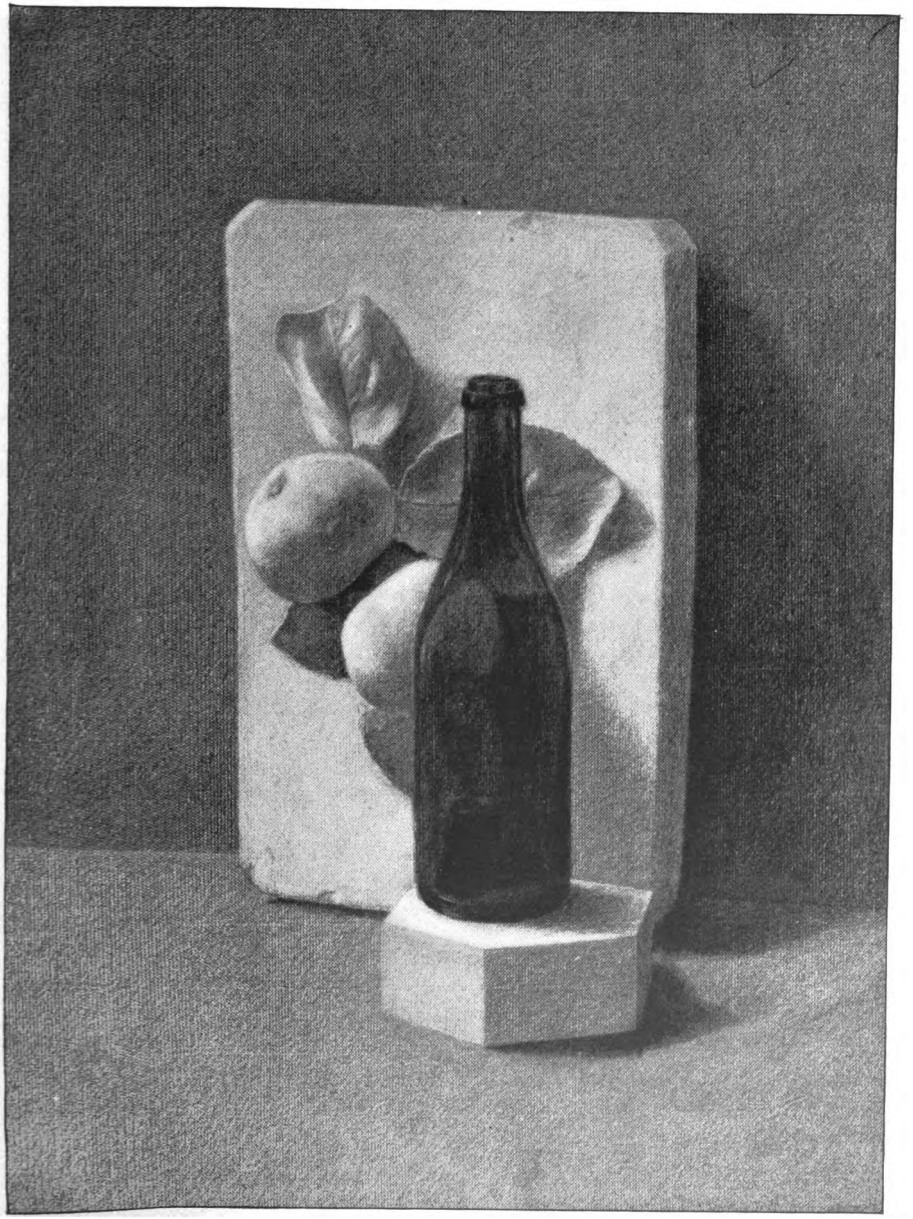


FIG. 40. From Charcoal Study.

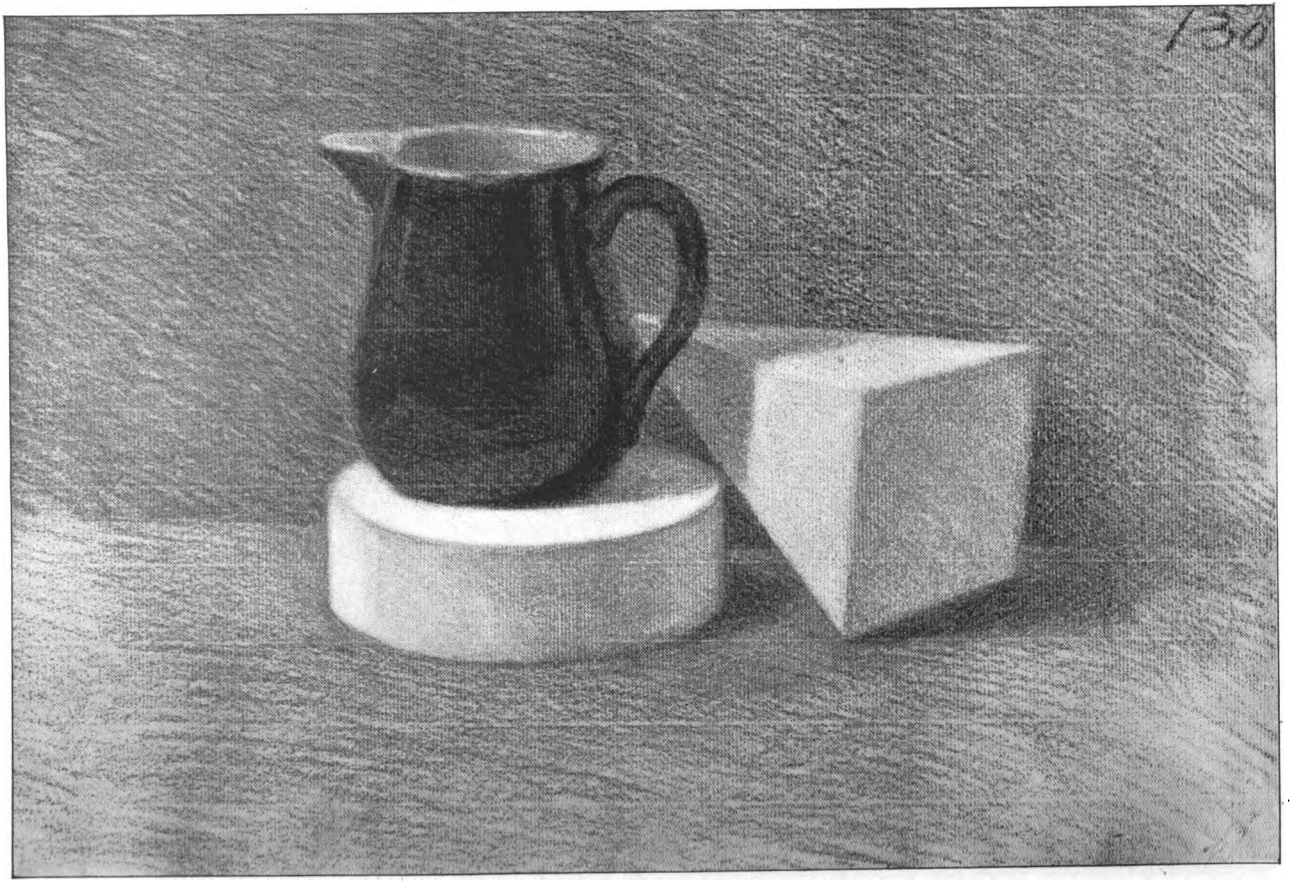


FIG 41. From Charcoal Sketch — Time, 2 Hours.

FIG. 42. From Charcoal Study.

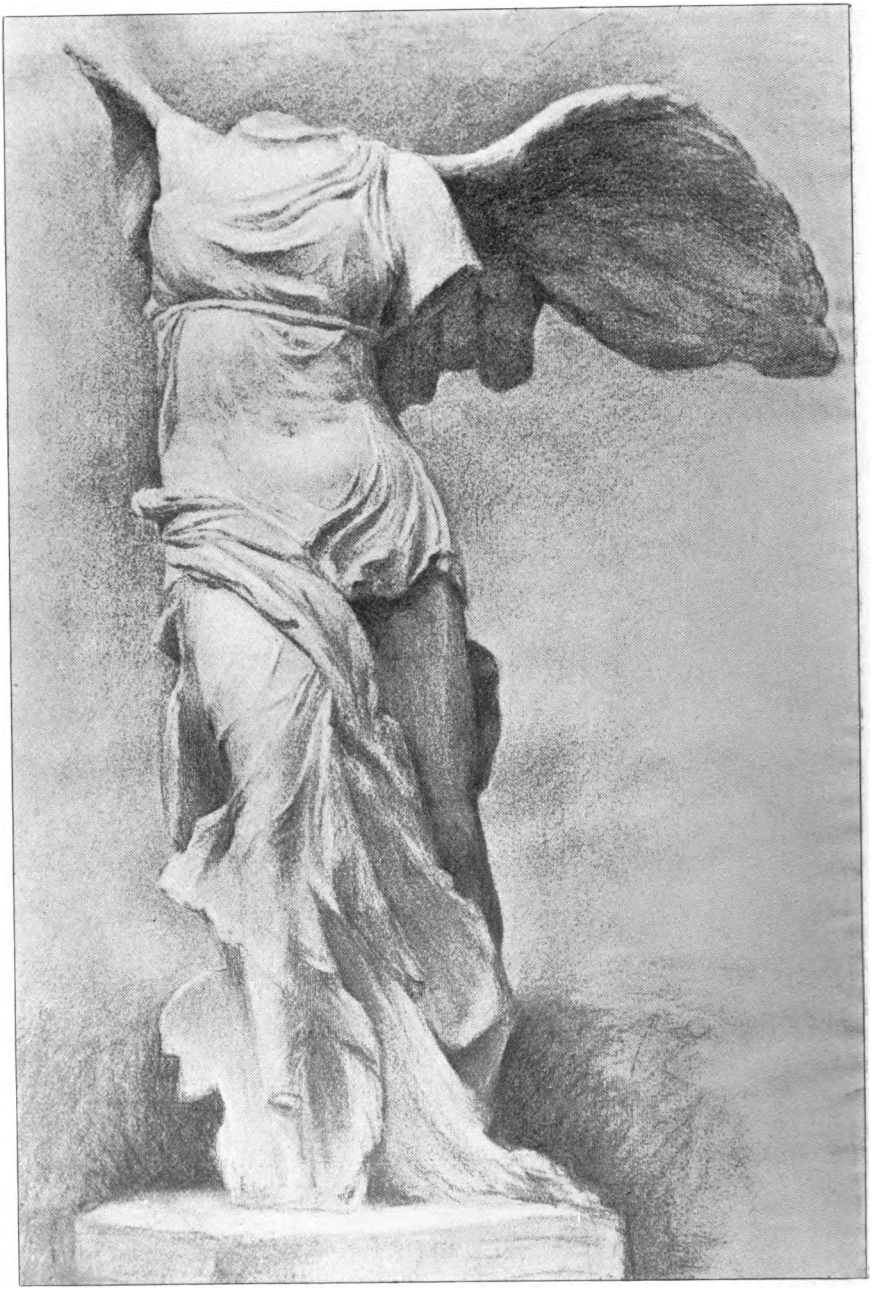


FIG. 43. From Charcoal Study.

FIG. 44. From Charcoal Study.

value to the art student. He should be satisfied to begin to study as explained, and should continue to make time-sketches until able to represent such groups as well or nearly as well as these figures, so far as values and drawing are concerned, before attempting to paint or make highly finished drawings. The student who attempts to paint or make finished drawings when not able to see masses and values, will waste his time and produce simply childish or mechanical drawings without breadth or effect.

Figs. 36, 38, 40, and 42 are from drawings upon full-size sheets of charcoal paper by students of the entering class of the Massachusetts Normal Art School. They illustrate the work the students should learn to do after they are able to make good time-sketches. The reproductions are not quite true in values to the originals, but they show the careful study of masses and details which students should be led to make in order to obtain a good foundation for more advanced work. All who intend to study painting should first study values in charcoal from still life, for this study will do more for the beginner than any other work; it will give him knowledge which he may be many years in obtaining if he begins painting without the foundation of drawing and values.

After this study of still life which enables the student to see form and values, he may draw from the antique such subjects as Figs. 43 and 44; after this work, he may draw from life; and finally he may study painting, beginning with still life which will prepare for the painting of the head and figure.

Artists often use gray paper and put in the lightest parts with white chalk, but the student is earnestly advised to use simply white paper and charcoal, and to use his judgment as to when to apply the various methods explained for erasing and changing the drawing and the values, remembering that all methods may at different times be serviceable, particularly those first on the list.

When the student can draw he may combine different methods and mediums in the same drawing, and use as much latitude as the artists of the past display in the work they have left for us to study, and which we will study to our great advantage if wise enough to profit by our opportunities.

CHAPTER VI.

PENCIL DRAWING.

MATERIALS.

Pencils. — Pencils should be of good quality, free from grit, and capable of producing soft grays and strong blacks. It is not possible to specify the grade of pencil required for free-hand drawing either in outline or in light and shade work. The "broad gray line" drawn with a very soft pencil is often thought to be essential to good drawing; but a drawing must be judged, not by the quality of line employed, but by what it represents. As different drawings represent different subjects and different effects, they cannot be treated in the same way, and so one may require a soft pencil and another a hard one.

The grade of pencil to be used depends upon the size of the drawing, upon whether its chief purpose is to represent form or values, and also upon the amount of detail it is to represent.

If a pencil sketch is to be made quickly as a note simply of light and shade effects, a soft pencil will be necessary to obtain the best results. If the sketch is quite small and intended as a study of the form and details of construction of a head or other subject, more than as a study of the masses of light and dark, it will be necessary to use a medium or even a hard pencil. It is impossible to make a small drawing which represents many details by the use of a soft pencil or a broad gray line, and the smaller the drawing and the more detail it has, the harder the pencil must be. The old masters often used a pencil made of pure silver, which gave a soft, smooth gray line; it could be made very sharp, and would retain its point for a long time, and was well suited to the careful studies of form, such as Fig. 27, which these famous artists often made. The pencil used must be suited to the work to be done, and may range from the softest (6 B or 4 B), which may be used for such sketches as Figs. 24, 50, 53, 54, and 60, to grades such as 2 B, B, or HB, which may

be used for such work as Figs. 56 and 57 ; while pencils as hard as 2 H or even 4 H may be used upon very small drawings or very careful studies, such as Fig. 27.

For all studies of values and rapid notes of effects, it is well to use as soft a pencil as the size of the drawing and the surface of the paper will permit. Students who have to make many trial lines in order to obtain the proportions cannot use soft pencils in making

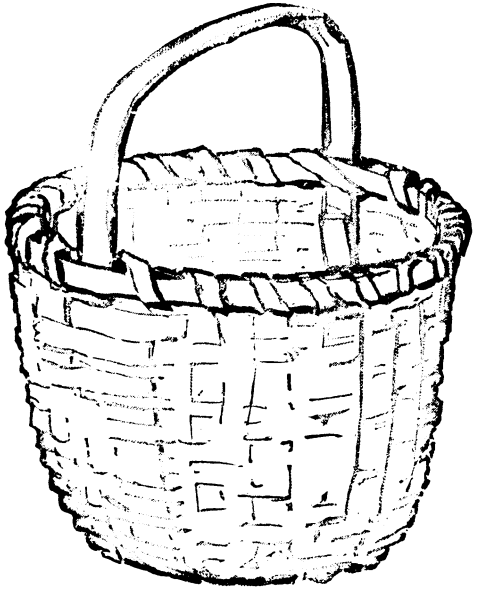


FIG. 45.

these touches, for they will produce lines so heavy that the eraser will be required, and even then the paper may not be left in good condition. Pupils who cannot draw fairly well should use, in beginning any sketch, a medium or hard pencil very lightly, so as not to indent the paper; but in accenting an outline drawing whose lines have been thus determined, or in giving simply light and shade effects, a soft pencil should be used.

Paper. — The paper to be used depends upon the drawing to be made. If the drawing is to be a study of form principally, such as

Figs. 27 and 59, and if it is to be worked upon with a medium or hard pencil and with an eraser, the paper should be tough and smooth, though never glazed. If the drawing is to be a rapid study of masses and effects of light and shade, such as Figs. 50, 54, 55, and 56, the paper should be soft and smooth, and cheap grades are more likely to be suited for such sketches than expensive grades.

A rough paper, such as Whatman's cold-pressed paper, is not

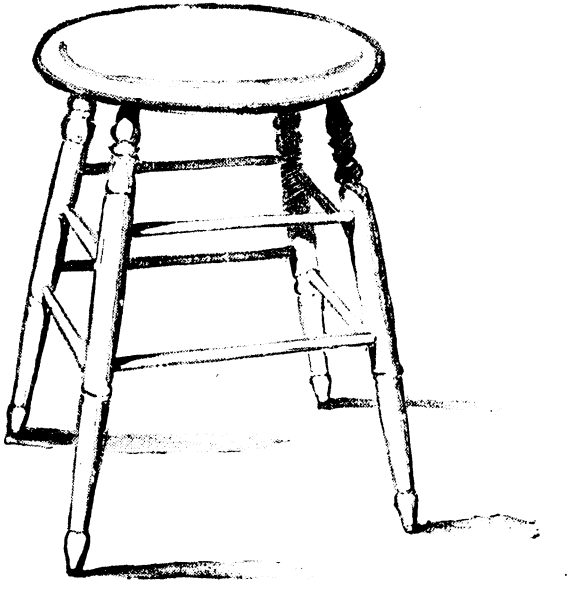


FIG. 46.

suited to rapid sketches of light and shade effects, especially when the sketches are small, for the grain of the paper produces the effect of spots, and smooth tints and atmospheric effects cannot be produced without blending the lines with the finger or the stump.

A very satisfactory drawing may be made upon Whatman's cold-pressed paper by blending the pencil tones with the finger, the stump, or the eraser, used as explained in Chap. V. The drawing thus produced is similar to a charcoal drawing, though much more delicate; it may be made very pleasing and atmospheric, especially

when the subject does not require strong darks. This method of blending a pencil drawing to obtain values is more difficult than the use of the charcoal, for it does not allow changes as readily as the

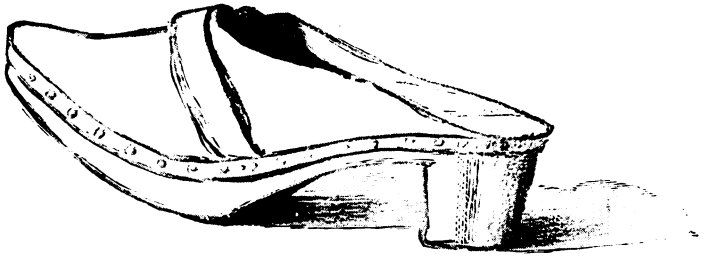


FIG. 47.

use of charcoal. It is also less direct than the use of the pencil point, consequently students are advised to obtain gradation by the use of the point whenever this is possible, and to draw so as to be obliged to use the eraser but little.

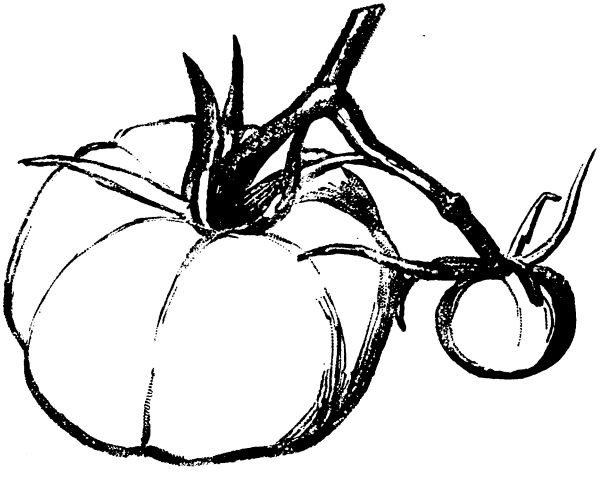


FIG. 48.

The surface of the paper must not be glazed or hard and smooth, for it will not take the pencil readily; it must not be so soft as to be torn by the pencil, or by the eraser if it is necessary to use this. A good paper for such sketches as Figs. 50, 54, 55, and 56 is given

by using the smooth side (the back surface) of English crayon paper. This paper is, however, very expensive, and cheap papers will often be found which give good results. Paper as cheap as that of a daily newspaper is often better suited for rapid notes of effects than expensive papers. Paper varies so much that of two lots of the same make and grade, one may be excellent and the other unsatisfactory, and practice alone will enable one to select paper and pencils suitable for any particular drawing; but pupils should remember that success is not so much a question of materials as of ability to draw.

Erasers and stumps. — All the materials suitable for charcoal and crayon drawing may be used upon a pencil drawing, and in the same ways.

Making a Pencil Drawing.

The effects of light and shade seen in nature have been explained, and also the ways in which these effects should be studied and represented in a charcoal drawing. It must now be understood that the student who represents nature by light and shade has the same problems whatever the medium he employs, and success depends more upon ability to see than upon medium or technique. If the student can draw, he can draw with any medium; he will, of course, acquire facility of execution by long use of the medium, but no directions can be given which will produce pleasing handling except the advice to study long enough to draw quickly and truly.

Use of pencil point. — The most important directions for pencil drawing have been given under the topics "Pencils" and "Paper"; but in addition it may be said that the result should always be obtained as directly as possible; and in rapid sketches, such as Fig. 50, the student should aim to produce the effect of atmosphere and of nature by means of tones produced by hatching wide pencil lines closely together so as to produce the effect of an even tone of shade. In more finished drawings, such as Fig. 27, the effect of the graded tones required should be produced by working over the surface of the paper with the pencil point alone.

In rapid notes, such as Fig. 50, care must be taken that an unpleasant effect of separate lines is not produced by too much space

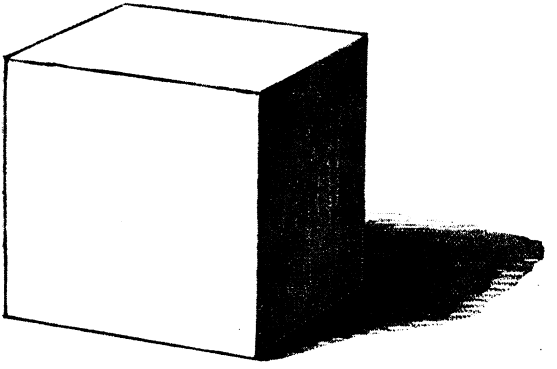


FIG. 49.

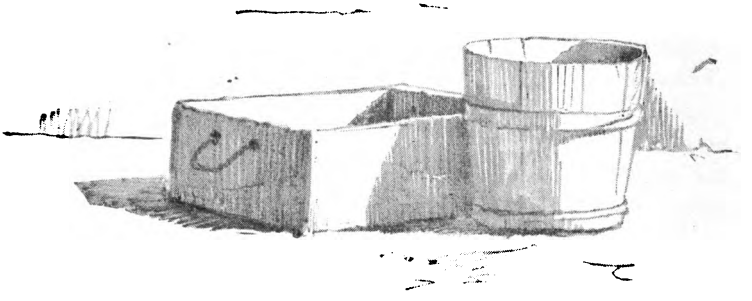


FIG. 50.

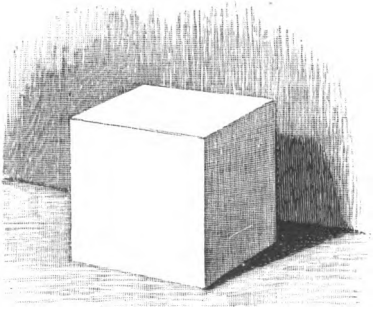


FIG. 51.

between the lines, and in this work the strokes should generally adjoin each other so that the effect of separate lines is not given.

The most important point in all work introducing light and shade effects is that outlines should be avoided whenever this is possible. When the values are not given and outlines are required, the out-

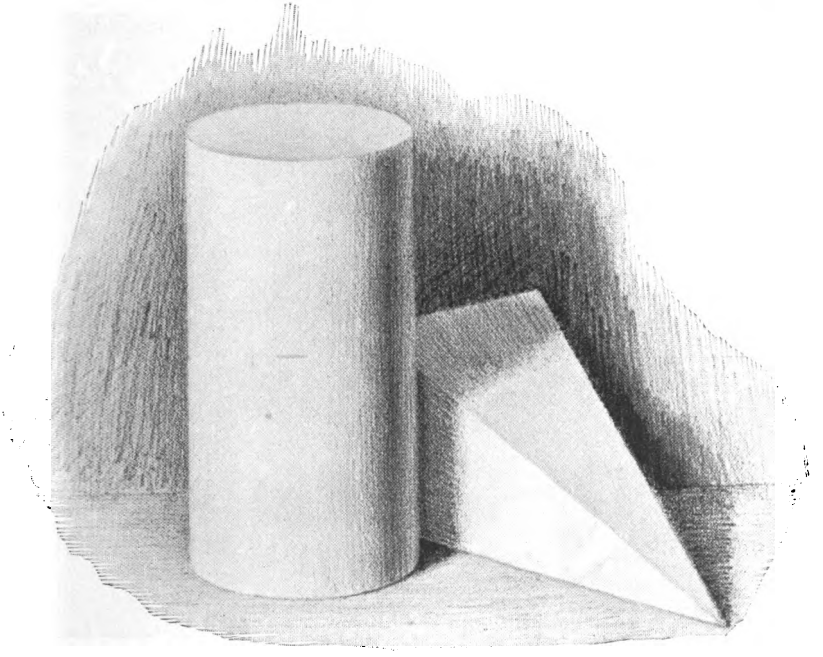


FIG. 52.

lines should not be uniform in any way, but should be varied in width, not continuous, and not perfectly straight or regular, even when they represent perfect type forms. See "Free-Hand Drawing," Chap. I.

Various methods. — A pencil sketch may give simply a suggestion of the form by means of outline, or in addition to the outline it may give light and shade effects ranging from the slight touches which serve to suggest the roundness of the object to a study of the full values.

The simplest change in an outline drawing in the direction of light and shade is given by representing the narrow shadows and by suggesting the wider ones by thickening the outlines; this produces what has been called an accented outline drawing. Fig. 45 is of this nature and much more satisfactory than a uniform outline.

The next step in advance is given by representing cast shadows and by suggesting the shadows by increasing the width of the out-

FIG. 53.

lines. When objects are composed of small parts, as the stool (Fig. 46), this treatment produces an effective sketch which suggests the principal divisions of light, shadow, and cast shadow. The figure shows how much the cast shadows add to the effect given by the accented outline.

Fig. 47 is similar to Fig. 46, the effect being largely due to outline and to the cast shadows. The drawing differs, however, from Fig. 46, as it represents the shadow upon the heel, and thus gives the contrast of the masses of light, shadow, and cast shadow, by which principally we recognize objects.

Shadows and cast shadows are given to produce a stronger impression of nature than can be obtained from an outline, and no shading which does not help to suggest the facts should ever be placed upon any drawing. If the cast shadow in Fig. 49 were given without the shadow side, the effect would not be as satisfactory as a simple outline, for the outline would suggest the cube ; while if the cast shadow were represented without the shadow side, the first impression the drawing would create would be that of curiosity concerning the nature of the cube which throws a cast shadow and yet has no shadow surface. Generally when the cast shadow of

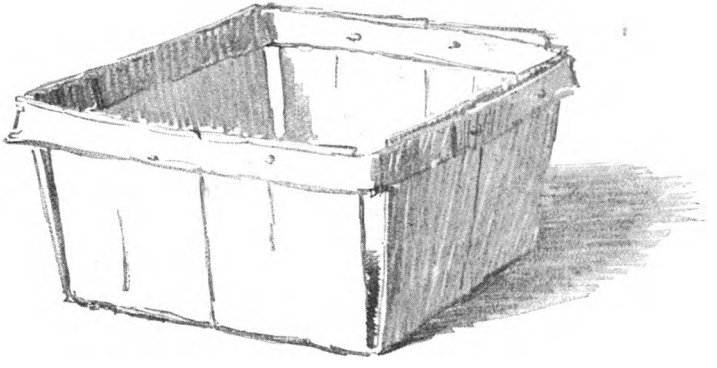


FIG. 54.

an object is shown, the shadow surface adjoining the cast shadow should be represented whenever it is visible ; and the larger it is and the more the object resembles a type solid, the more necessary it is to represent it.

If the shadow side of an object, the cube, for instance (Fig. 49), is represented and the cast shadow is omitted, a satisfactory drawing may result, for an object is often seen when situated so that its cast shadow is some distance away from it or even invisible ; but when an object is represented as resting upon any other object and is shaded to represent a shadow surface, the drawing will generally be unsatisfactory if the shadow of the object cast upon its support is not represented.

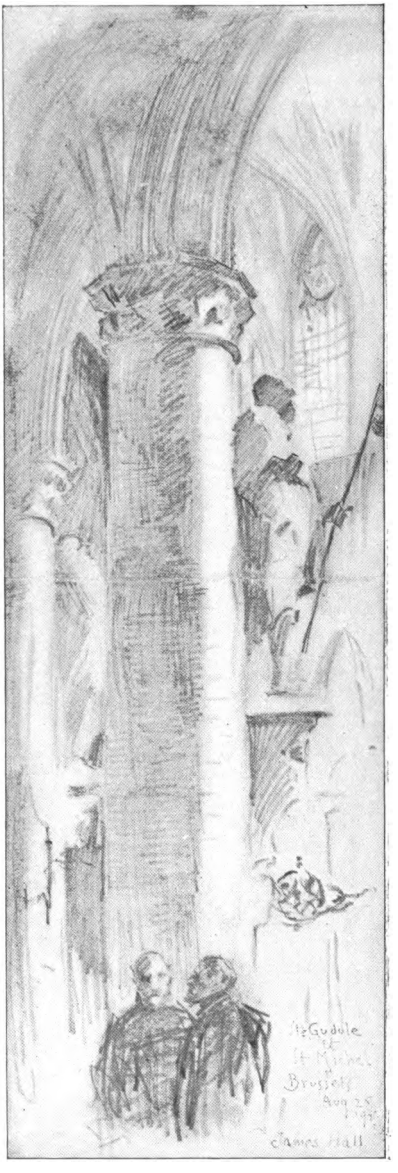


FIG. 55. From a Pencil Sketch.

Satisfactory drawings similar to Fig. 48, which represent more or less perfectly the shading upon an object, are often given when the cast shadow of the object is not represented. Fig. 27 is carried much farther than Fig. 48, and is an example of a different nature; it is, however, a drawing, for it consists in part of outline.

Use of background. — In order to avoid outlines it is necessary to use a background ; this may be vignetted against the object and extend no farther than is necessary to relieve the parts of the object which are lighter than the background. The use of an outline along the upper part of the bucket in Fig. 50 is thus avoided, and backgrounds may be used in similar ways or may extend completely around the drawing as in Figs. 51 and 52. Fig. 51 is more effective than Fig. 49, but is still not true to nature, for it represents the edge separating the two faces in light by a line. Fig. 52 is more satisfactory than Fig. 51, for it represents the objects wholly by light and shade and defines the edge separating the two faces of the pyramid in light, not by a line as in Fig. 51, but by the slight difference seen in the object in the values of the two surfaces.

Fig. 53 is similar to Fig. 52 but is more effective, as it represents objects of different colors and has much stronger contrasts of light and dark. Fig. 53 shows the nature of many of the subjects which the artist represents and in which the principal contrasts of light and dark are often due to color as much as to light and shade. In making any drawing an artist represents the most prominent effects, and so most sketches give at least the shadows and cast shadows and any marked contrasts due to different colors. Figs. 47, 50, 54, and 58 show the simplest rendering of these effects; such sketches are quickly made, and are very effective and well suited for illustrations.

The student is advised to use this method for rapid sketches giving the form and the principal light and shade and color effects; and he should fill sketch-books with notes similar to Figs. 50 and 54 until he can give the form and the masses of dark truly in a few minutes.

This method of making a sketch by means of three or four tones is particularly adapted for illustrations which are to be reproduced by the cheaper processes, for the tones may be produced by means of

FIG. 56. From a Pencil Sketch.

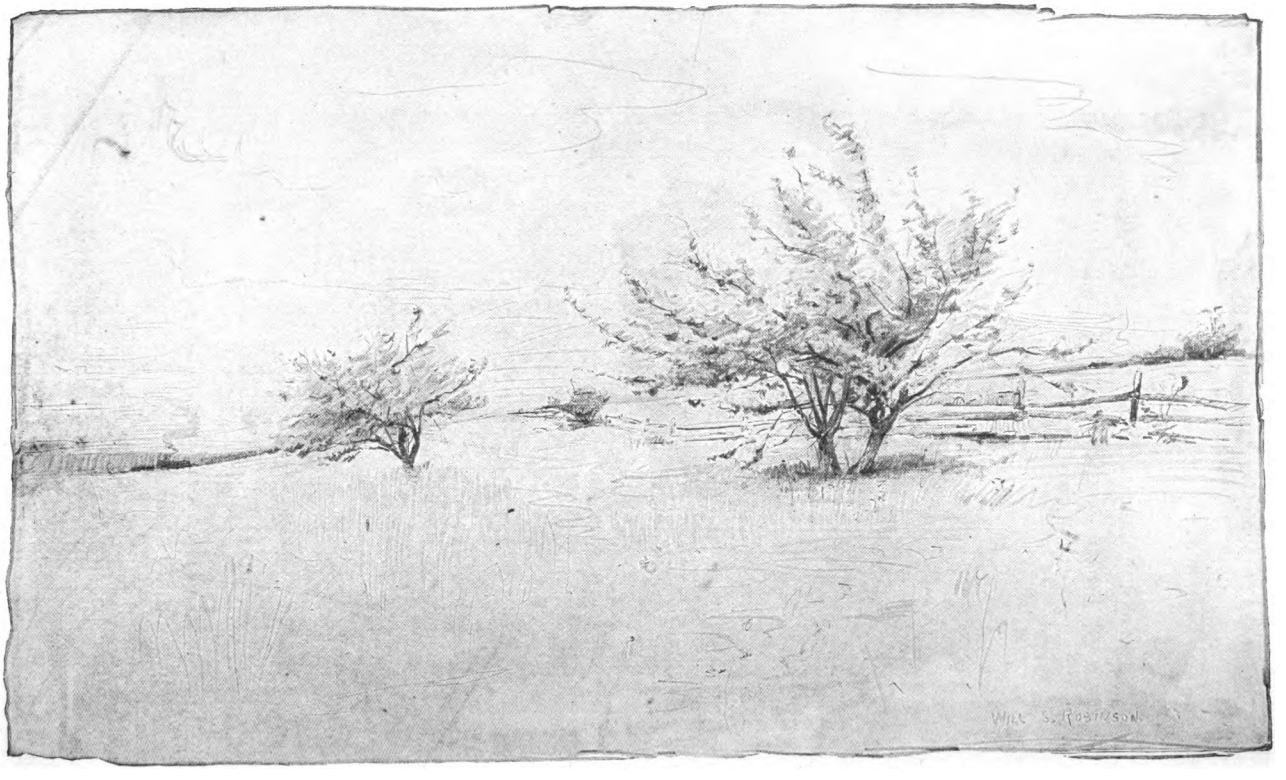


FIG. 57. From a Pencil Sketch.

lines which may be varied in width and so spaced as to give the effect of shade without joining each other; while the same effect in a wash or blended drawing cannot be cheaply reproduced.

When the student has time to study more detail than is given by

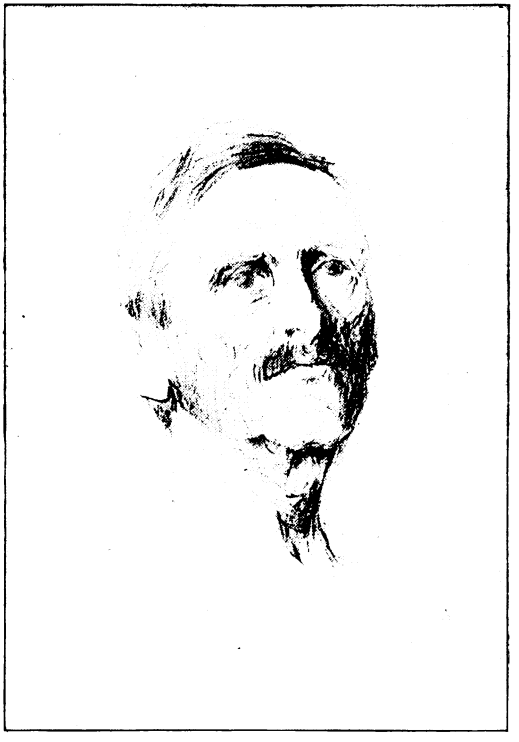


FIG. 58. From a Pencil Sketch.

this rendering, he should employ a background, as in Figs. 52 and 53; and the study in this way of such groups of still life is advisable, as it gives the best preparation for work from life such as Figs. 59 and 60.

Fig. 58 shows the beginning of a sketch from life. It is carried but little farther than the outline stage illustrated by Fig. 26, but a sketch begun in this way may be carefully finished without a back-

ground, as illustrated by Fig. 27 ; or it may be finished with a background and be similar in effect to the head of the woman in Fig.

FIG. 59. From a Pencil Sketch.

59 ; or it may be carried still farther and be a study of full values such as Fig. 28.

Fig. 60 is a study by Rembrandt which gives the shadows and cast shadows and the modelling in the mass of the light. Such a drawing is most true and satisfactory when it represents dark objects, or objects which appear darker than their background, and the study

illustrates the fact that the background is always least necessary when an object appears darker than its background.

Interiors and landscapes. — When representing interiors and landscape subjects the artist has the same choice as to what he will represent as when drawing the subjects already considered. He may use simply outline. If this is done the drawing would

FIG. 60. From Crayon Sketch by Rembrandt.

generally be accented; but if not confined to outline, light and shade effects would be introduced just as in the sketches previously considered.

Fig. 55 represents the masses of light and shade and color, and shows the method used in Figs. 50 and 54 applied to a more extended subject. Figs. 56 and 57 show the same method applied

in landscape. It is possible to make, with a pencil, studies of full values of such subjects; but it is not easy to do this, and generally the artist is satisfied to give the form and suggest the effect by representing the masses of light and shadow, and also those of dark color.

The more picturesque the subject, the more necessary it becomes to render it artistically, and the more important it is to avoid outlines; or, if this cannot be done, to avoid making them uniform in strength or direction. Outlines should never be drawn where the form is expressed by shading, and, whenever possible, form should be given by hatchings of lines forming a tint of shade or shadow as illustrated by the lines of the ridges of the fish houses of Fig. 25. This applies to all work with the pen as well as the pencil.

The directions given in Chap. V and in this chapter, to avoid uniformity and regularity in both outlines and values, must not be construed to mean that regular objects are to be represented as irregular. Students often think that it is necessary to represent a regular curve, such as an ellipse, by an irregular line, and a straight line by lines in different directions; but such drawings are more unsatisfactory than those which mechanically represent the facts, for they do not represent the facts at all. Regularity cannot be represented by what creates the idea of irregularity, and the student who takes pains to produce variety will generally produce mechanical and unpleasant effects, for pleasing variety is due to the accidental effects produced by the attempt to express directly what is felt.

It is possible to make artistic and inartistic drawings of any subject which shall be equally true as far as the facts of form are concerned. Thus, two portraits of the same person may be equally correct as likenesses, and one be mechanical and unsatisfactory, while the other is artistic and pleasing in consequence of slight gradations and variations which produce an atmospheric and natural effect without changing the form. Students must realize that the vibrations of the atmosphere produce slightly irregular appearances in regular objects, but do not change the general impression of the lines and masses, and any variation from mechanical accuracy which causes false ideas of form must be avoided.

CHAPTER VII.

BRUSH DRAWING.

MATERIALS.

Brushes. — Round sable brushes should be provided for study in water color if the best results are desired. These brushes are very expensive, as they cost from two to seven dollars each, but the art student cannot find a satisfactory substitute, and should have at least one large brush about ⅜ of an in. in diameter and 1 ¼ inches long; its handle should be at least 9 inches long. The brush should have a fine point so that as fine a line can be drawn with the largest brush as with the smallest. Sable brushes are firm, elastic, and always keep their shape if they are carefully washed after using and brought to a point before they are laid aside. Camel's-hair brushes and brushes made in Japan are cheap and suitable for use in the public schools.

Bristle brushes are used by some for painting. They are also very valuable for washing off color and obtaining high lights, as they are stiff and will quickly remove the color; a flat, short, and stiff brush should be used for this purpose. The sable brush should never be used for washing or obtaining lights, as this will soon spoil its point.

Pigments. — The brush may be used with any pigment in making a water-color monochrome, but satisfactory results will be obtained only by the use of transparent colors. Bright colors such as red and orange may be used, but the first impression created by their use is generally that of the color instead of the subject of the picture, and the student is advised to use no bright color for monochrome work.

The best results will be given by the use of sepia, neutral tint, or Payne's gray. These colors should be the moist colors prepared in pans or in tubes from which they may be squeezed into pans.

India ink may be used, but this ink should be prepared by grinding a stick of ink, as the liquid inks contain chemicals which cause them to penetrate the paper so that changes are made with difficulty.

India ink is not as desirable as the colors in pans, for the use of these gives better preparation for painting from nature in water colors.

Charcoal gray gives clear gray tones well adapted for reproduction, and is a desirable color when one is able to obtain effects directly; but it is not suitable for students who must try many times to secure the effect, for the color is not absorbed by the paper, and is very apt to be removed or rendered spotty by the methods which students must employ to obtain truthful drawings.

Paper. — Whatman's papers are best suited for water-color work; of these the cold-pressed paper may be used, but the rougher papers intended for water-color work will generally give better results.

Cheaper papers may be used if they are hard and have a rough surface which is not readily injured and which will stand washing with the brush or sponge.

Making a Brush Drawing.

The student who understands light and shade and is able to make a truthful, artistic drawing in charcoal or pencil requires little more than an explanation of the nature of any medium, and the most important facts regarding its preparation and its use, in order to be prepared to obtain by study that familiarity with the medium which will allow artistic work to be done.

A brush drawing may be made in a great variety of ways. To explain the subject thoroughly would require a book instead of a few pages, so that only the most important points can be explained.

The simplest use of the brush is that in which the point of the brush is used with color for the production of an outline drawing. In making such a drawing the outline would often be varied by the artist, as is illustrated by the sketch of the lion (Fig. 61) by Rembrandt.

Another simple effect readily produced by the brush is the silhouette; this often gives in an interesting way the beauty and variety of form seen in nature.

A brush drawing may be done in flat tones representing the different values of the colors of the subject, as in the case of much of the

poster work now done; or the color values and also the details of form and color within these values may be given as in Japanese paintings.

The brush is also used to produce more or less complete studies of form and values such as have been explained previously.

The method explained in Chap. VI, by which sketches are made by representing shadows, cast shadows, and colors by the use of three or four tones, is well adapted to brush rendering upon dry paper, and subjects, such as Figs. 50, 54, and 56, are often repre-

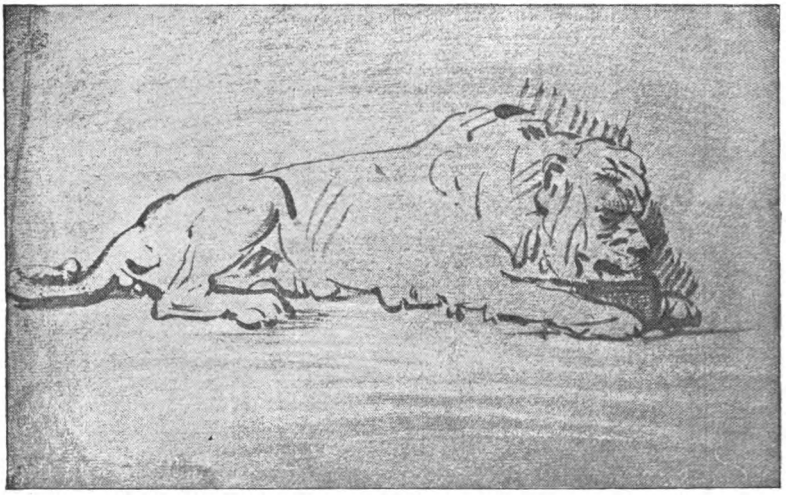


FIG. 61. From Sketch by Rembrandt.

sented in this way with the brush. In fact any of the drawings done with the charcoal or pencil might have been rendered in the same way, so far as values are concerned, by the use of the brush.

Two very distinct methods of working in water color with the brush are briefly explained as follows:

The dry method. — In this the paper must be stretched by wetting it and then securing it to the board by means of mucilage, tacks, or in any other way. Instead of stretching the paper, many artists use water-color paper which has been stretched and prepared in the form of blocks.

The paper is often secured to the board by means of a frame which is arranged to fit upon the edge of the board and to clamp the paper to it. In this case, to stretch paper it is only necessary to wet it and then to clamp it to the board by this frame.

Some artists prefer to stretch the paper upon a stretcher, such as is used for a canvas in oil painting, securing the paper to the stretcher by means of tacks. When thus placed upon a stretcher, both sides of the paper are exposed to the air so that the paper will dry much more quickly than when upon a board. Much valuable time is spent in waiting for washes to dry, and the use of a stretcher in this way is consequently helpful.

When the paper has been stretched, some artists will suggest the form very lightly in outline with the pencil; others will use the point of the brush and color to indicate the principal lines and proportions; sometimes the forms of the shadows may also be lightly indicated. Some artists may not consider it necessary to draw any outlines of the forms or shadows before beginning to represent the values by washes applied with the brush. Few students will, however, be able to draw directly with the brush; and since water colors are not easily changed when once they are placed upon the paper, students are advised to determine the form and principal lines very lightly with the pencil until able to draw well at first touch. In thus using the pencil or the brush, care must be taken not to make the touches strong enough to show when the drawing is finished, for in all work outlines must be avoided.

When the drawing is thus suggested, the student may begin to wash in the values. A large brush should be used, and the color taken with it from the pan and mixed with water enough to produce the desired tint; this should then be applied with a brush full of color. The wash should be quickly floated over the entire surface to be colored, in order that a clear tone may be produced. The wash should be moved with a regular motion of the brush, and should not be allowed to stand in one place longer than in another. It should not be allowed to dry within any part where an even value is desired, as where a wash dries it produces a water mark. The washes should be begun at the top with the paper slightly inclined so that the wash flows toward the bottom of the board. The side of the brush should

be applied to the paper when large spaces are to be covered, and the point of the brush when small parts are worked upon or when careful drawing is required.

The student should carry the first washes over as much of the surface of the paper as possible. The first wash, which must be very light, can generally be carried over the entire paper with the

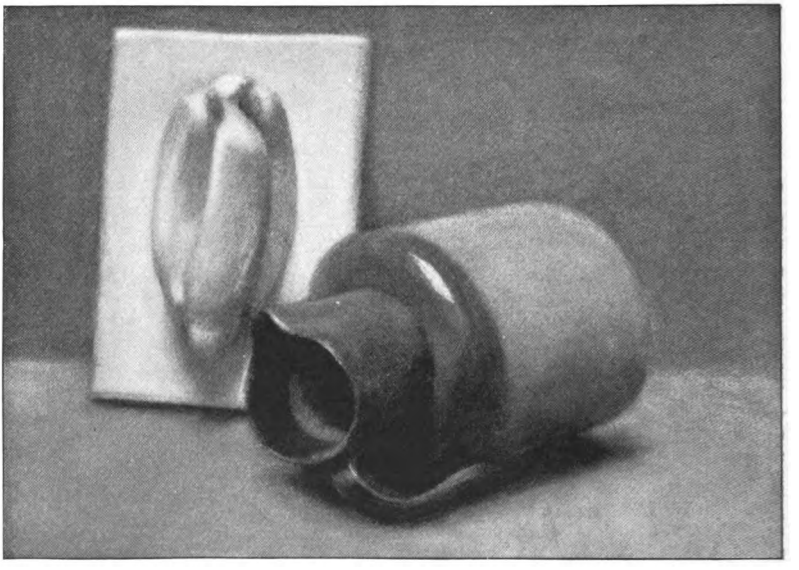


FIG. 62. From a Water-color Sepia Drawing.

exception of the high lights. Before beginning with the washes, some artists go over the entire paper with clear water in order to dampen the paper so that the washes will not dry too quickly and produce water marks; but this is not necessary, as the first light wash will dampen the entire paper with the exception of the high lights.

When the first wash has dried, a second may be placed upon it, but if the second is applied while the paper is wet, the first will be at least partially removed. The second wash should be carried over as much of the paper as possible, and over the contours of

all objects and parts which are seen against darker values; the wash should be varied to represent the gradation seen in the subject. The effect produced by these washes should be similar to the charcoal sketch (Fig. 33), so far as the masses of light and dark are concerned.

All washes, even the first light one, should, when possible, be graded when applied, in order that they may represent as directly as possible the variety of effects seen. The washes should be prepared by taking the color from the pan with the brush and mixing it in the cover of the box with water enough to produce the desired tints; but the tints should not be perfectly mixed before they are applied to the paper, for perfectly even tones will not produce the best results. For this reason, as far as possible, graded washes should be produced directly upon the paper by adding water when the wash is to be made lighter, and by adding color when it is to be made darker. The color to be added should be taken from the pan with the brush and applied directly to the part of the wash which is to be strengthened; it will be taken up by the water of the wash and thus softened, and may be blended so as to produce any desired gradation and strength of color. When color is mixed in this way upon the paper, the tones are not perfectly even, and the variety thus produced gives a crispness and a charm to the work which can be obtained in no other way.

The student should try to grade every wash applied so that the variety seen in nature is suggested; but he will not be able to give all the values by the first washes; and so when they are dry it will be necessary to strengthen some parts by going over them again, and possibly to lighten some parts by washing part of the color off.

In order to avoid bringing washes in both directions up to any outline, the washes should always be carried over all outlines whenever it is possible to do this. If the washes are not frequently carried over the outlines they will either overlap or not quite meet at the outlines, and in either case will dry and form water lines which outline the object and produce a hard, mechanical effect. It may be possible for artists to obtain pleasing effects by placing each value by one wash upon simply the part it represents. Drawings of this nature are most frequently seen done in color, but

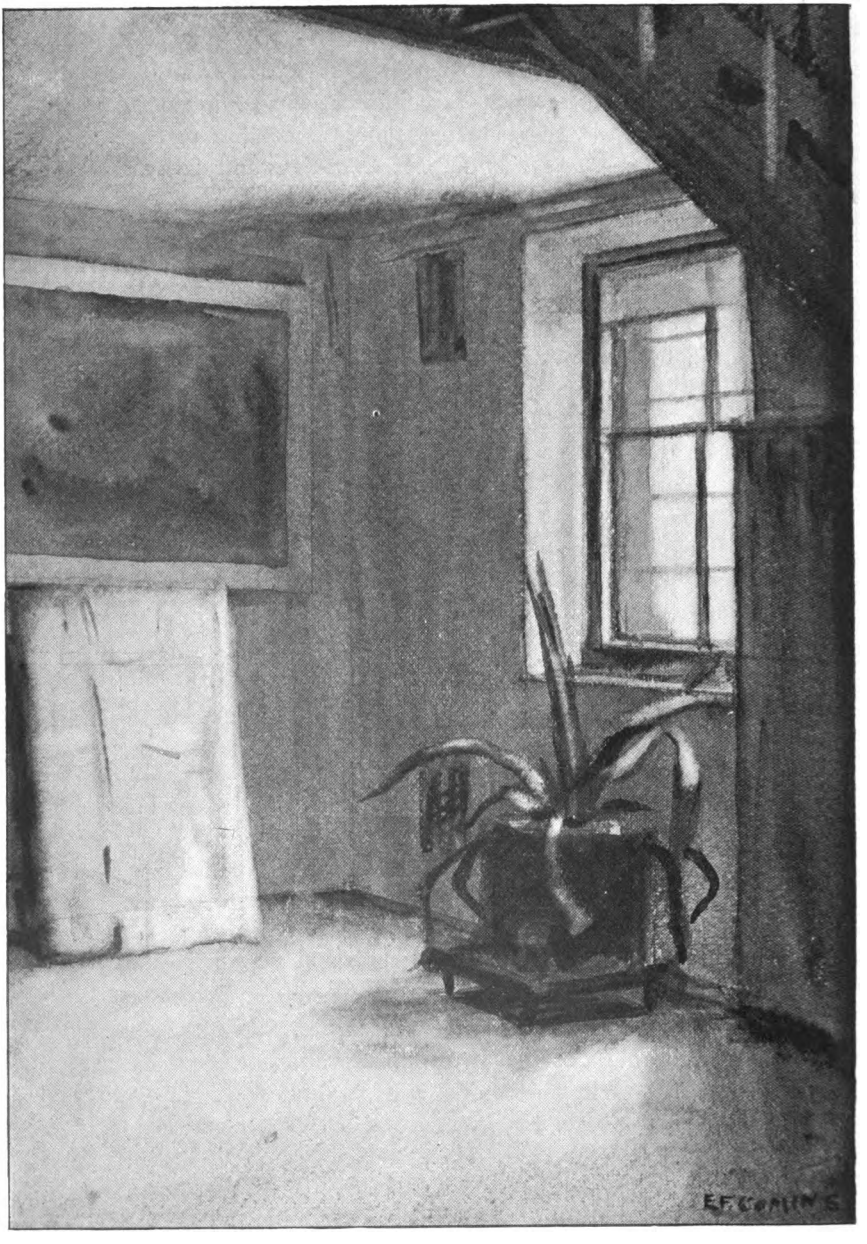


FIG. 63. From Water-color Sepia Study.

the difficulties of producing artistic effects by this method alone are so great that students are advised not to attempt it. They should obtain effects by working over outlines as much as possible and by decreasing the size of the washes as their strength increases, until finally the accents of dark, which complete the drawing, are added.

When a brush drawing is well started it will be well to give, in some small part, an accent of dark as strong as may be desired in the finished drawing, in order that as the drawing progresses the darks may be compared with this accent. In this way the values may be given so as to avoid making too light or too dark a study.

If the color runs or is dropped upon parts where it is not desired, it may be removed by absorbing it with blotting paper or with a brush from which the color has been pressed.

When the study is hard and crude as a result of unavoidable water lines, the paper should be dried and then thoroughly washed with clean water and a soft sponge or a brush. The grain of the paper should not be injured in doing this, and if little rolls of paper begin to form, they show that the washing process must stop if the paper is not to be spoiled. Washing in this way will greatly improve a hard drawing, and most satisfactory effects are sometimes produced by washing a drawing which is apparently in a hopeless condition.

Some artists obtain their effects principally by use of the sponge and brush upon drawings intentionally made crude and hard, in order that they may be softened and brought together by washing. Students should know the value of this method, but they should aim to produce results directly, and should never work with the intention of producing false effects which are to be subjected to the action of accidental processes.

Students should aim to produce an atmospheric effect by grading the washes as they are applied, and especially by grading them along the contours. A hard effect will be given by any drawing in which the washes are keen and sharp at the contours, or in which lines of light or of dark are formed by water lines or by washes which do not quite meet.

The wet method. — This method is called the Dutch method because used by these painters, and it differs from the dry method in making use of paper which is kept wet until the finishing touches

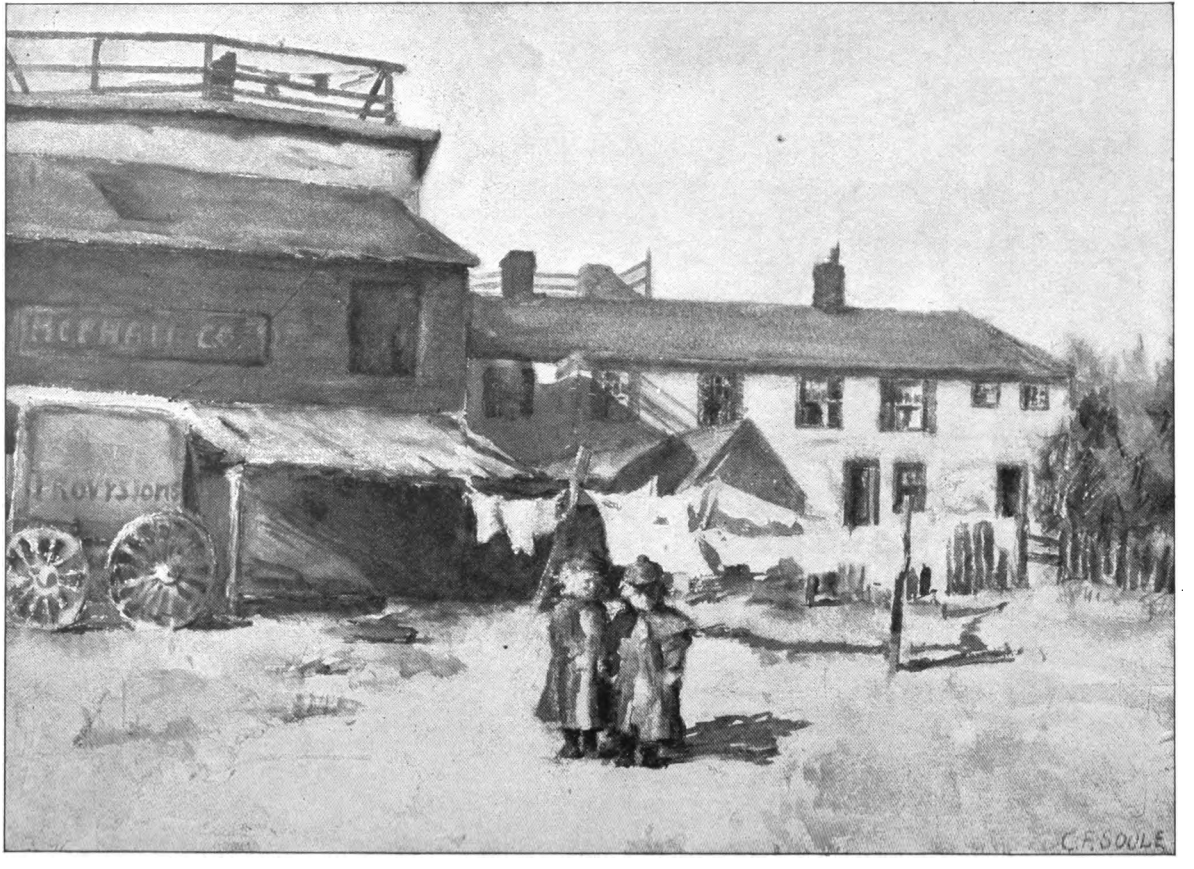


FIG. 64. From Water-color Sepia Study.

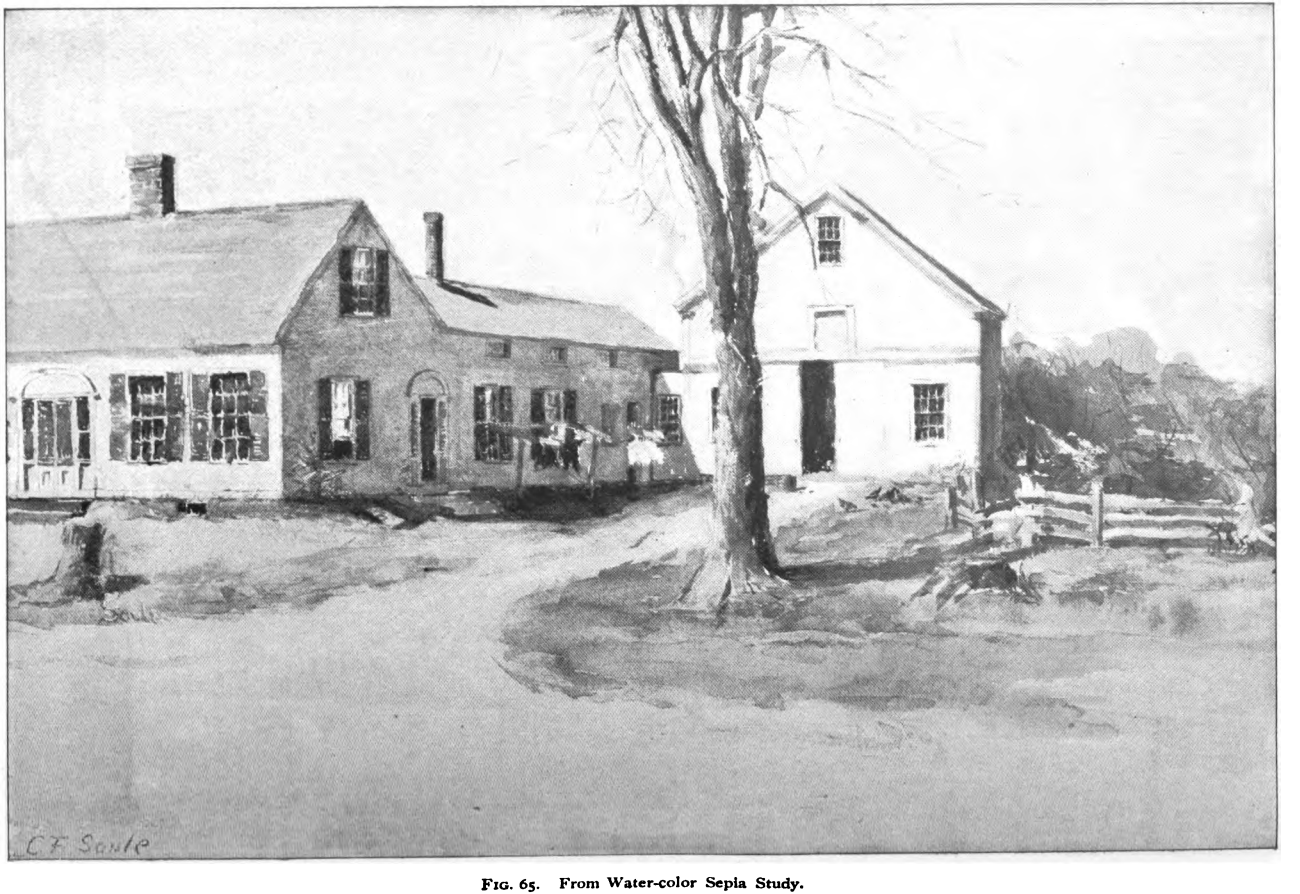


FIG. 65. From Water-color Sepia Study.

are applied. This avoids the crude effect given by the dry method when objects are sharply defined, or when washes dry and form water lines.

The paper to be used is soaked in water, and also a piece of blotting paper as large as the paper, and the two are then placed together upon the drawing board, the blotting paper being under the water-color paper, and both are secured to the board by rubber bands encircling the board and placed upon the edges of the paper. The drawing is then made with the point of the brush, just enough water being used to moisten the brush and cause it to take up the color. When the principal forms are suggested in outline, the masses of dark are put in with the side of the brush, just enough water being used to cause the color to mix and to flow from the brush to the wet paper. The water upon the paper dilutes the color and causes it to flow evenly and produce tones which softly blend into each other. No tendency to hard outlines is produced, but, on the contrary, the effect of the drawing in its first stages is extremely blurred, for the different tones grade into each other and produce simply masses of light and dark with no separations or decided forms throughout the drawing. The paper being wet all the time, there is no danger that the color will dry and produce water lines, and as much time as is desired may be spent in studying the proportions and forms of the dark masses as they are put in. When the paper has been covered so as to suggest the effect of light and shadow, the darks should be strengthened by working more color into them with the brush. The color should be taken directly from the pan and worked into the dark masses throughout the drawing until the proper contrasts of light and dark are obtained. In thus strengthening the darks, if the color spreads into the lights it may be taken up with the blotter; and the bristle brush may be used to lighten any parts which may be too dark.

When the masses and the effect have been obtained as explained, the paper should be allowed to dry so that if color is placed upon it with the brush full of color it will not run. The necessary decision and the accents should then be put in with washes which are allowed to dry without blending; and the drawing should be finished by carefully drawing with the point of the brush any details of dark

needed, and by taking out with a stiff bristle brush any accents of light.

This method gives softness, except where decision is produced by the finishing touches, and is an artistic method capable of producing the most beautiful effects. The method is at first difficult, particularly when colors are used; if this method is not used by students, its principle should be applied as far as possible so as to cause the washes placed upon dry paper to blend and to soften into each other in all the first stages of any drawing. Decision and keenness are given only by the accents produced by the last work upon the drawing.

The best method for the student who represents values seems to be a combination of both methods, the first work being done with the paper wet, and with color which is worked into the paper so that the different values throughout the drawing are represented by tones which softly grade into each other. When the masses are quite strongly indicated, the paper should be allowed to dry and the drawing finished as explained under the "dry method."

Figs. 62, 63, 64, and 65 are students' drawings intended as studies of values, and made by combining both methods as explained above; they show how the knowledge gained by still-life study in charcoal may be applied to more interesting subjects.

CHAPTER VIII.

DRAWING IN THE PUBLIC SCHOOLS.

The Pencil or the Brush.

The question whether the public school pupil shall first study in outline, in light and shade, or in color is one upon which very different opinions are held. Some teachers claim that the pupil should begin with color; others that he should begin with light and shade; and others claim that his first study should be in outline.

If pupils could start rightly and under the best conditions, it is not a matter of great importance whether pupils begin with outline or with light and shade; but it is generally impossible to secure the best conditions and the question really is what is advisable, considering the fact that most of the instruction is given by grade teachers, and is given under very poor conditions as to light and materials.

Outline is a medium which conventionally represents the least important features of a subject; light and shade effects are far more important than contours; and color effects are more important than light and shade. But the question of the relative importance of the three is of little assistance in enabling us to decide how the pupil may make the most rapid advance, for he must be able to draw, and able to give values and also color effects, if he is to paint a picture; and his training must not give undue attention in any one direction.

It is also evident that it should not present the most difficult problems to the youngest pupils. It is a question if work in light and shade would be more difficult for young pupils than work in outline, if the pupils could have, as instructor, an artist who was at the same time a trained teacher; but as regards color, there can hardly be much difference of opinion. Probably most artists will say that they have personally seen color as it really appears only after having studied many years; and often they will say that they have for the

first time seen the delicate color distinctions, which are essential to the best work in color, after they have made their reputations as artists.

There can be no question that color is far more difficult to see than light and shade. Mediums for color study are very expensive and difficult to prepare and use, and thus color is not so suitable for the beginner. Even the artist is relieved when he works upon a subject where it is not absolutely essential for him to think of the form, light and shade, and color at the same time.

We must decide, then, that the most important work of the pupil at first is to learn to draw; and whether this shall be by work in outline or by study of light and shade depends upon the age of the pupil, and whether he is studying in a studio with an artist or in a schoolroom with a teacher who has had little time to devote to art work.

It is possible that young pupils may be taught to see effects so that they may work with advantage in light and shade; but for this to happen the pupils must have the best conditions as to light and instruction. At present there are few teachers not specialists in the public schools who have specially studied light and shade, and for this reason alone drawing in these schools should at first be in outline.

It will be said that only teachers duly qualified should be employed; but even if this were always done, there are other reasons why in the public schools it is better to begin with outline drawing. First is the fact that until pupils can draw contours with approximate truth, they cannot make light and shade drawings of any merit. Second, there is no sure and simple way by which pupils can learn to see values, while, as explained in "Free-Hand Drawing," they can teach themselves to draw correctly. These facts lead us to decide that the first study in the public schools should be in outline.

In the past much of the public school instruction in drawing has been such that artists and others informed upon art and art education have pronounced it mechanical and harmful. This has become generally known, and consequently we find that in all possible ways attempts are being made to improve instruction in drawing and to change public opinion concerning the nature of this work.

The work done in the past has been principally in pencil outline; hence the pencil is now discarded in favor of crayon, colored crayons, the brush, and pen and ink. Even the first instruction in some schools is with the brush, and sometimes brush-work is the principal instruction given through all the grades. As a result of such methods, we find on exhibition in some places drawings which to the public are much more interesting than the pencil outlines exhibited in former years, and pupils are much more interested in such work than in the work formerly done. There is no question that interest is increased by any and all work which suggests picture-making. But the interest of the pupil is not the only point to be considered; if it were, we should not ask him to study spelling or arithmetic if he does not like these studies or shows more interest in manual training, chemistry, or any other subject. The pupil's interest is desirable, but is it to be allowed to influence instruction in drawing more than it does instruction in other subjects? Good instruction will create interest, and yet interest is not proof of good instruction; for methods which make the pupil's work or the teacher's work easy will often be popular, and the more harmful these methods are, the more interest they will often create.

The popular interest in light and shade, in crayon drawing, in colored crayons, in brush work, in painting, and in pen and ink in the lower grades of the public schools is largely due to the reaction from the mechanical work of outline drawing *mechanically taught*, and is often not based on sound principles or sound instruction. The pupil who receives instruction not based upon sound art principles will be no better off than the one who formerly was taught to make mechanical free-hand drawings. There will, however, be a great difference in the cost, for while instruction in pencil drawing is inexpensive as far as materials are concerned, the instruction which allows the pupil to think that he can paint before he can draw will cost many times as much for materials as that formerly provided.

The public should understand that to give a boy a paint-box does not make him an artist, or give him the power to draw any more truthfully than he can draw with the lead pencil. Public school graduates have generally been unable to draw with any degree of facility, or even accuracy, the simplest objects about them, and

consequently the public demands that some change in drawing be made. This demand is now met in some places by putting into the hands of the pupil a brush instead of a pencil. With this brush the pupil makes drawings which are freer than the outline drawings he formerly made; but are they any truer, any more like the objects studied, and will this training enable the pupil to draw correctly? With the brush the pupil draws leaves, flowers, vegetables, etc. These subjects are such that they are recognized if the drawings are far from correct; the handling of the brush produces variety and accidental effects which are often pleasing and artistic, so that to the casual observer, who cannot compare the drawings with the objects, it may seem as if the work was a great advance over the simple outline work previously done. But ask the pupil who has used the brush exclusively, or even largely, through all the grades, to draw a chair or a corner of a room or a landscape, and he will in many cases draw no better than he formerly did.

The remedy for poor drawing is not to be found in a change of mediums. If instruction in drawing is based upon good methods, the pencil or the brush or any other medium can be used, and the student will learn to draw; but until he studies the appearances of nature, and not simply the handling of any medium, he will never draw any better than he has drawn with the instruction of the past, which has taught him to use a pencil mechanically.

I do not mean to say that in many places good may not result from the present movement in favor of other mediums than the pencil, but this will come principally when directors of drawing base their efforts on the serious study of nature and on the careful comparison and correction of all work, until the eye has learned to see truly enough to allow the hand to express form rapidly.

The pupil who has not learned to draw quite truthfully by the use of the pencil, or some other medium, which permits frequent changes, will only waste time and money by taking up work with the brush and India ink, or work in color; and teachers are earnestly advised not to allow pupils to attempt this work until they can draw fairly well in outline.

If proper instruction in the lower grades is given in pencil outline, pupils will be interested, and they will learn to draw before they

enter the higher grammar grades, so that in these grades it will be possible to begin the use of the brush and other mediums more difficult than the pencil. The first subjects for brush instruction should be foliage, vegetables, etc., for errors in drawing will not appear at first glance in this work; but the brush should not be used until pupils can avoid the most serious errors of drawing.

Pupils may receive good instruction in outline and light and shade and study exclusively or largely with the brush, but they will gain nothing by so doing. On the contrary, they will lose; for to learn to draw is a difficult problem if made as simple as possible, and the brush makes it much more difficult than other mediums the pupil may use, with far less expenditure of time and money. The pencil is cleaner than any other medium and more durable; it is equally well adapted for the slightest sketch or for the most careful study, and it allows changes to be made much more readily than most other mediums. It is at the same time the cheapest medium, the most educational, and the best in all ways; and far from being childish or mechanical, it is, and has been, a favorite medium of nearly all great artists.

The pencil is adapted, not only for the first work in the public schools, but for the use of all art students; and when students have the advantages of a studio and an artist as teacher, they should use the pencil part of the time, even if they begin with the study of light and shade in charcoal, for it is necessary to study form as well as values. To whichever subject the student first gives his attention, he should change for a time, and make the other of first importance.

Charcoal is better adapted for the study of values than any other medium, for changes in the values of the charcoal drawing may be made most readily. The pencil is better adapted to the study of form than the charcoal, for it has a fine, durable point, and with it the faintest touches may be made; so that it is possible to change a drawing many times without any use of the eraser, by gradually strengthening the touches. Making a drawing in this way, without the use of the eraser, until the correct lines have been found, gives the best drill in drawing, and is the only artistic method; and teachers of private classes and of art-school students should depend

upon their judgment as to whether their pupils shall study values first with the charcoal, or form first with the lead pencil.

First Work in Light and Shade.

Having shown the different methods in which the pencil may be used in light and shade work, we will now consider what public school pupils in the lower grades may do, bearing in mind the facts that the drawing instruction must generally be given by teachers who have had little chance to study art, and that the lessons must be given in regular classrooms, with the conditions as to light, models, etc., very unsatisfactory.

Light and shade drawings are often made by copying or by dictation methods; but such work should never be permitted, and when teachers are not able to explain principles, or to make or criticise light and shade studies from nature, students should not attempt light and shade work.

The subject of light and shade is not so difficult that teachers who wish to give elementary instruction in it cannot, after a little study, qualify themselves to direct the work, for pupils will readily see shadows and cast shadows upon common objects, vegetables, foliage, etc.; and teachers may so direct pupils that when such subjects are drawn, effects similar to Figs. 46, 47, and 48 may be produced.

All teachers will be able to show that objects have light surfaces and shadow surfaces, and throw cast shadows. Most pupils will readily see these effects, and with but little explanation will be able to make from nature drawings similar to Figs. 50 and 54.

Pupils who do not see these effects will be assisted to do so if the teacher places in front of a cylinder, at least a foot in diameter and exposed to a side light, a sheet of paper in which a hole is cut so that through it the pupils may see part of the light surface and part of the shadow surface, but not the contours or enough of the cylinder to recognize it. The pupils should not be allowed to see the cylinder before the paper is placed in front of it. This experiment may readily be made by rolling up a sheet of white paper and tying it together at its ends to form the cylinder, and placing it in position when the pupils are out of the room. It should be so situated that

the pupils can see it only through the hole cut in the paper placed in front of it. There are few pupils who will not see the light and dark upon the cylinder when it is thus situated, and after they have done this, the paper in front of the cylinder may be removed, and they will then realize that the light and dark was really upon one white object, and due wholly to light and shade. Pupils who can see these effects of light and shade will readily represent them by simple masses, and may thus begin their study of nature's lights and shadows.

When work more advanced than this is desired, it will be well to study the cube, or a similar object, as follows:

First place the cube in a side light producing an effect similar to that of the plinth in Fig. 8, and have the pupils represent the effect as in Fig. 49. Next place the cube with the light in front of the pupils so that the effect is similar to that of the plinth in Fig. 11. The pupils will represent the cast shadow and the two vertical shadow surfaces by dark tones, and the top of the cube by an outline. Next place the cube so that the light comes from behind the pupils, and so that the effect is similar to that of the plinth in Fig. 10, and ask the pupils to make a light and shade drawing of the cube. The pupils have been accustomed to represent the cast shadow and the shadow surfaces by dark tones which have produced the effect of the drawings. But now the effect of the subject is entirely light, and cannot be represented by shading any surface of the object as the pupils have been in the habit of doing. This effect will show the pupils that it is often necessary to use a background, and this may now be represented so that the cube comes out light against it as the object does against its background in nature.

The cube should now be placed in different positions and with different backgrounds, so that its shadow surface appears first darker and then lighter than the background, and the pupils should be asked to represent the value of the background as well as that of the shadow and cast shadow. Drawings such as Fig. 51 will result.

It is now time to ask the pupils to observe that the light faces are not equally light, and the sphere should be studied to show the gradation that there is in the masses both of light and of shadow. The pupils should make a careful study of the sphere from the object,

and should give all the gradations that can be seen. After this they may study a colored object and a white object at the same time. In their work from this time on they should represent a background or not, according to the nature of the subject. They should understand that a dark object seen against a light background, or any object which appears darker than its background, may be effectively rendered without a background; but when any object appears lighter than its background, in whole or in part, a sketch true in values cannot be made without the use of a background. If pupils are taught to observe nature, and understand that their sketches should be truthful representations of what they see, they will be interested in the work, and will make rapid progress.

The artistic method of making these pencil sketches is to suggest the proportions of the drawing and its principal masses by lightly indicating the principal shadows and cast shadows, and then strengthening them so as to obtain drawing and values at the same time, as explained in Chap. V. Public school pupils will not be able, however, to draw well enough to work in this way at first, and they will be obliged to indicate the outlines of the objects before beginning the shading. If in obtaining correct form the outlines become strong, the eraser should be used to make them very faint before the drawing is shaded. When possible no shadow or edge should be defined in a finished drawing by an outline; and whenever a background is used the forms may always be shown by the values alone.

Perfectly accurate geometric solids are not the best subjects for this work, as it is difficult to represent the facts of their form in a drawing artistically handled, and a subject such as Fig. 54 is far preferable to the cube of Fig. 49. The type solids should, however, be studied first, and sketches similar to Fig. 52 are advisable, as they show at the same time the student's capacity for drawing truly and for rendering light and shade effects.

At first pupils should be allowed to work slowly and carefully in order that the shading may not extend beyond the outlines; and no directions should be given restricting them to shading by means of lines or by means of strokes in any special direction. They should use a soft pencil, having a wide point, so as to produce even tones

in any way that occurs to them, and should at first think only of the values and the forms of these tones.

After the students have worked for some time representing the darks by tones secured by whatever use of the pencil is natural to them, they will work more freely and directly, and they may then be asked to produce shading by moving the pencil back and forth in the direction of the surface to be shaded, so as to obtain the shading by means of lines whose direction helps to express the surface. Thus on the foreground the strokes of the pencil may be about horizontal, and upon the background they may be vertical or inclined a little from the vertical. The pencil strokes that form the shading upon any object may have such a direction that they help to express the form of the object; but it will not be possible to formulate rules for determining the direction of the pencil lines used in shading, for there must always be variety, and the principal directions must be contrasted by lines having other directions. It will not do for the lines of shading always to be vertical upon vertical surfaces, or horizontal upon horizontal surfaces, or oblique upon oblique surfaces, or to follow the exact curvature of curved surfaces; but the pupil will be assisted by remembering that such directions will often produce the most satisfactory results. The effect will be most satisfactory when the shading follows these general directions, and is varied by other lines which keep the effect from becoming monotonous.

Pupils in the lower grades do not draw freely enough to profit by devoting much attention to the direction and kind of lines by which the shading is obtained. Until pupils can draw quite freely and give the masses of light and shade readily, it will only be necessary to see that they use the side of a soft pencil so as to produce even tones of shade; and also to see that they do not use its point, or a sharp or hard pencil, so as to produce fine lines either when shading or when drawing the contour of any object.

The help to be derived from the most suitable direction of the pencil lines, or rather tints by which the shading is given, is mentioned in order that teachers may understand that rules for handling cannot be given, and that the only point which should decide satisfactory technique is whether it gives a pleasing and true impression of the object represented.

To be satisfactory, pencil work must be free and must be varied,—just how is a question which can only be decided by each pupil through his own efforts; and the individuality of each will express itself, so that among sketches by half a dozen different persons there may be no two sketches which are alike in handling. Study from nature and the comparison of his work with that of artists will enable the student to gain an interesting technique with the pencil or with any other medium.

It will be possible to study very simple light and shade effects in a common schoolroom, the object being placed near the window. But to make at all finished studies it will be necessary to have a good light. When rooms are situated so that groups cannot be arranged to receive light from one window, it will be necessary to make special arrangements. A group may be arranged upon a drawing board placed upon a stool in front of a window. If sunlight enters the window it should be curtained by white cloth. A board may be placed behind the group to serve as a background. If light comes from the opposite side of the room, it should be shut off by placing a second drawing board vertically at the side of the group.

To obtain in such ways the proper conditions requires much time and preparation; but this is necessary if the subject is to be attempted when suitable rooms are not provided.

Pupils who have used the pencil for light and shade work may use the brush for this purpose. In the upper grades pupils who can give light and shade effects with the brush may sometimes be able to study from still life with water colors. Such pupils may also use pen and ink, but this medium should not be used when pupils are not able to make good light and shade drawings with the pencil. No work in drawing should be allowed in the drawing hour of such a nature that pupils cannot by study discover their errors, or of such a nature that the teacher cannot criticise the drawing. Progress is not made by attempting difficult subjects or the technique of the artist. Progress comes only from work upon drawings whose errors the pupils can largely discover themselves, and which beyond this point can be criticised by the teacher.

As in all teaching, the great trouble in public school work has been, and is, that students wish to study subjects too difficult for them;

they wish to make light and shade drawings and to paint before they can draw in outline; they wish to draw the human figure before they can draw a cube. Often teachers allow pupils to spend their time in attempting the advanced when they cannot represent the simple subjects. Thus, in the public schools, pupils often make illustrative drawings from imagination, depicting subjects that would require the skill of a trained illustrator to draw with any degree of truth. Such work interests the pupils and trains the intellect, and is valuable in this way, but it cannot train the eye to see. It is not properly the study of drawing, and should not be permitted to take the place of that study of nature and that criticism of all drawings which discovers their errors, for advance is impossible except by discovery of error. The teaching which is based upon the idea that criticism of drawings will discourage the pupil, and that if allowed to work without criticism he will in time outgrow his errors and draw correctly, will result in the loss of much valuable time and effort.

Art students who realize the difficulty of success as artists will do well to consider the problem of teaching drawing in the public schools, for by giving part of their time to this teaching they can support themselves, so that they can paint from love of art. To teach drawing well is not a low aim, and if advanced art students should fit themselves for teaching by normal study, they would often benefit themselves while elevating drawing instruction.

School committees would assist in improving drawing instruction if in selecting teachers of drawing they acted on the principle that the best teacher is, other things being equal, the one who can draw and paint the best. It should be understood that the art teacher can never become perfect in his profession, but must always be studying and growing in artistic power.

If the best results are desired, the director or special teacher of drawing should have at least two days each week in which to study, to draw, or to paint. Drawing teachers are often expected and feel compelled to prepare papers and materials for teachers and classes, so that all their time out of school is occupied in work which amounts to the making of text-books and copies for teachers and pupils. There is no more reason why the drawing teacher should be expected to make such copies than there is why the music teacher

should be expected to prepare music charts. Drawing teachers should not be obliged to do such work. The work they do in school is far more trying and difficult than any other teaching, and instead of working all the time, in school and out, they should do justice to themselves and their pupils by studying nature part of the time. In no other way can this most difficult subject of instruction be properly presented. Committees should also understand that no system of drawing instruction can be devised which will dispense with the special teacher, or which can succeed without a competent specialist to instruct and direct the regular teachers.

CHAPTER IX.

ADVICE TO THE ART STUDENT.

The person who wishes to study art should realize that it is a profession in which nothing of artistic value can be produced without patient study and serious and long-continued effort. The life of the artist is one of never-ceasing work. To it he must bring the enthusiasm of youth, the strength of manhood, and all the energies of his soul; for his problem is not the representation of the exterior alone, but the study of the soul — the soul of nature. The most talented men fail to solve the mysteries of nature, and the problems of the artist can no more easily be solved in a few years, or in even a lifetime. He must always be a student, and by study advance day by day, if he does not wish to go backward. This is true, not only of the work which distinguishes art from industry, but of the mechanical phases of his work, and students should not begin the study of art without serious consideration of all that it involves.

Many begin the study of art with no definite purpose, or with simply the aim to acquire slight general knowledge. Of course, it is desirable that art should be a subject of general study, and that all schools should give art instruction suited to their pupils. Nothing will do more to advance a people than the study of art, and the love for art and nature which it will produce ; but those who study should have a definite result in view, and one which is possible for them to attain.

Advice is needed by those who spend time and money on teachers ignorant of art, and whose methods consist simply of allowing pupils to think that they are studying painting while making copies which are worked upon by the teacher, so that, as a result of a few lessons, oil paintings are produced, which are taken home for framing. The public should understand that no one can produce work fit for exhibition without long study ; and that no teacher is giving good instruction when he works long upon his pupil's drawings. No teacher should allow pupils to think their first work more satisfactory or

more artistic than are the finger exercises which the music pupil finds necessary.

A few years ago the word "chromo" suggested the worst in art, but now it is possible to obtain chromos which are in every way much more satisfactory and desirable than many original oil paintings; for the processes of reproduction have been so perfected that one not well informed on art matters cannot distinguish the difference between an original picture worth hundreds of dollars and its reproduction worth a few cents, or, at the most, a few dollars. A good reproduction of the best art is much more to be desired than an original painting which is inartistic. The percentage of good paintings is very small, and pride should not be taken in a picture simply because it is the original. The persons who take lessons with the idea that from the very first each study is to be used for decoration, not only unwisely spend their money, — for the same amount would provide the best art in photographs or color productions, — but they acquire the most harmful ideas; and students who wish to study drawing are advised to go to the best schools only or to artists of ability.

Before studying art with a view to making it a profession or a source of income, the experience of those engaged in art professionally should be considered, and, if possible, the advice of some well-known artist should be obtained. If the honest opinion of a strong painter could always be obtained, many who begin the study of art without the ability required to win success might be advised to their great advantage to enter other fields. The chances of success, either financially or artistically, in art are very small, and the art student should realize this before beginning the long and expensive course of training which many students go through before they realize that they have no talent for art, or that they cannot make a living by it.

"There is always room at the top," and the few great artists win fame and money; but if one will study the history of the past, he will discover that there are few great painters, and that at any time the number of artists whose work will stand the test of time and hand their names down to coming generations is very small. At the present time there are few painters who make a good income

from simply the sale of artistic paintings. There are, however, many good painters who do not sell one picture a year, and who live by illustrating, teaching, designing, or by other work, which is a necessity and not a choice, and which prevents them from doing in art the best work of which they are capable.

If art students would ask teachers whom they respect and whose work may often be widely known, they would find that oftentimes these teachers could not live by the sale of their paintings; and if, investigating further, they discover that even the painters whose work occupies the best places at the leading exhibitions often sell comparatively few pictures, they might wisely decide to enter some other profession.

The student who considers these facts will realize that if he tries for the best in art the chances are that he will have a small and uncertain income, and that he will gain success, if at all, only after many years of hardship; and that for one who finally succeeds in making money by the sale of really good pictures there are a hundred who try and fail. These failures are no doubt often due to the fact that the work is not artistically great; but it is very discouraging to the artist who tries to be serious and to produce good work — and who succeeds in a measure — to witness the financial success of many who are not serious, who are not students of nature or even clever painters.

Financial success is gained in many different ways; most rare is that due to inspiration, — to the genius which produces great art. This genius is generally recognized and rewarded whenever great work is produced, though many of the painters now accorded greatness lived a large part of their lives in almost poverty. Financial success is, however, frequently due, not to artistic merit, but to business ability or social influence. It is also due to the effort to suit the public and to paint its ideals, or, in other words, to paint what uneducated eyes see instead of good art and the truth concerning nature. This is especially true regarding landscape art. In figure work it is easier to appreciate the best art, but often in this line the work which is hard, mechanical, and most like a sharp photograph is that which is sought for, and the inartistic painter is often most successful financially.

To make money it is not necessary to study art seriously or to attempt to represent nature's effects of color, or even those of light and shade, for the picture which sells is too often the one which mechanically presents a pleasing subject truthfully as far as form is concerned, but which entirely disregards the appearance as far as light and shade and color effects are concerned.

It is very doubtful if a really great picture has ever been produced by a painter whose sole ambition has been to make money. Art is due to a love for beauty which makes the artist desire to produce the very best, which causes him to have no other aim; which leads him to go to nature for inspiration and to study her patiently and seriously, to work early and late, to endure poverty and hardship, and to allow nothing to interfere with the communion of his soul with the soul of nature, wherein lies at once his chief pleasure and his education. This love for nature and for beauty will produce the great art which is recognized, and which in time brings fame and money to the few who are geniuses. But great genius is very rare, and most who think they possess it will fail to realize their expectations; and though they may produce really good and serious work it is not the best, and not sought by the few who appreciate the best art.

The art student should understand these facts, and in the beginning decide either to work for love of nature and of the best art, or to make a business of art. Before deciding for the former he should carefully study the experiences of the few who are artistically great and note how many years they studied before they obtained success, and how hard they work even at the height of their success to satisfy themselves. If students only realized that the master whose work they admire so much very likely painted a dozen or even more times the head or hand which seems so hastily done with broad and careless strokes, before the final satisfactory result was secured, they would begin to appreciate the difficulties of the artist and to consider more seriously the problem before them. Students should realize that greatness is due to inspiration or genius, but that genius in the case of the painter must be combined with the faculty for hard work. Some work longer than others to accomplish the same results, but the history of art records none who have painted masterpieces while

they have been mere children. Children not in their teens astonish the world by their genius in music; it certainly is not due to work or study when the most difficult masterpieces and beautiful compositions are perfectly executed without thought or study by the genius of the child. But the language of the painter is more difficult even for the inspiration of the genius, who must work long and most seriously to acquire the manual skill and dexterity which will permit his genius to express itself. The earlier the serious art student realizes this and begins to study nature patiently, the greater his chances of success.[1]

If the student decides that financial success is his aim, he will most easily and surely obtain it by making social affairs and business methods his chief concern. He should study artists and their work to discover the taste of the public, and when he has decided what sells best he should paint in like manner.

People may assert that all are created free and equal, but the student of nature cannot agree with this statement, for he discovers that through all the lower and through all the higher forms of life nature gives unequal powers. As for men, no two are alike in every respect. The student of nature is lost before her mysteries, and with awe and reverence he contemplates the mighty intelligence, — the God who rules and directs all things. He soon is compelled to admit that nothing is by chance, that law regulates all things, produces all life, and arranges even the simplest details of all life, so that from the planets down to man and his most insignificant

[1] "Until a few years ago Chavannes never sold a picture. Millet lived his life in penury and obscurity. But thirty years of persistent ridicule having failed to destroy Degas' genius, some recognition has been extended to it. The fate of all great artists in the nineteenth century is a score of years of neglect and obloquy. They may hardly hope for recognition before they are fifty; some few cases point the other way, but very few. The rule is thirty years of neglect and obloquy, then a flag of truce will be held out to the recalcitrant artist who cannot be prevented from painting beautiful pictures: 'Come, let us be friends; let 's kiss and make it up; send a picture to the academy; we 'll hang it on the line and make you an academician the first vacancy that occurs.' To-day the academy would like to get Mr. Whistler, but Mr. Whistler replies to the academy as Degas replied to the government official who wanted a picture for the Luxembourg: 'Non, je ne veux pas être conduit au poste par les sergents de ville d'arts.'" — From "Modern Painting," by George Moore.

surroundings, all events are designed to accomplish the will of the Creator of the universe. It is in accordance with God's laws that men possess such different qualities, powers, and passions that no one can justly judge another, and so in art, as in other things, it is true that each must fulfill his mission. The art student may choose low or high ideals and then can do his best to realize them, but the student who has the highest ideals need not expect to realize them in a short time or without a struggle.

We may agree with these statements or not, but the fact remains that the art student who has his own living to earn has a most difficult problem before him, which in many cases he is never able to settle to his own satisfaction. This is often due to the fact that students begin the study of art without consideration of the facts which have been discussed, and often when without even average ability for drawing. Sometimes graduates of high and advanced schools have not had any training in drawing and do not know as much of drawing as a grammar-school student ought to know. I have met students who have entered art schools without ever having had a lesson in drawing or ever having tried to draw. Almost any one can learn to draw and in time to paint a picture which is a fair representation of appearances; but the average ability which enables one to do this is not enough to warrant one in taking up art as a profession, and no one should do this who has not studied long enough to prove himself the possessor of much more than average ability.

The difficulty of earning a living as an artist, illustrator, or designer is far greater now than a few years ago, for then there were few artists and draughtsmen, and the standard of work was far below what it is now. Then it was possible for one with average ability to study for a short time and secure a good income for work which now could not be disposed of at all. A few years ago it was difficult to obtain teachers of drawing, and any one who desired to teach had little difficulty in obtaining a position after having studied for a short time in the schools of New York or Boston. So great was the demand for teachers of drawing in the public schools that many students obtained important positions after not more than a year of study, and sometimes even less time was spent in securing a certificate which stated

that its holder was qualified to teach art. Such certificates may have enabled their possessors to obtain positions, but they could not enable them to teach what can only be acquired by years of study and experience, and much of the bad instruction in drawing has been due to the methods which allowed students who were just beginning to study drawing to receive diplomas stating that they were qualified to teach art.

The student of art at present must realize that all this is changed, and that now trained draughtsmen and even the best artists are competing for the work which a few years ago the art student found to do, and the position of teacher in any academy or private school is eagerly sought by artists who have generally studied abroad many years.

The teacher of drawing in the public schools requires training which the artist seldom obtains. This normal training is obtained at normal and normal art schools, and at present there are many first-class teachers of experience who have studied in art and normal art schools from four to six years, and often longer, who are waiting for a chance to teach drawing in the public schools. In the future it will not be possible for art students to support themselves after a year or two of study, for the positions will be obtained only by the very best and those with talent or influence. So the student must realize that whether his aim is to teach or to practice art, he should not enter an art school until he has shown that he has unusual artistic talent.

It is not necessary for a student to enter a school or to study with a teacher to discover whether he has talent or not. If he has ability he will be fond of art and of drawing, and he will draw and prove his talent, or at least his taste, for art, and he may by his own efforts acquire enough skill to prove the question of talent. The student who cannot take a few lessons at a good art school or with a good artist should study the art magazines which reproduce artists' drawings, and which give directions by artists and good teachers for art study; and he should study particularly the reproductions of the drawings and studies by the old masters, for they give the best possible material for study and inspiration. He should take these drawings, not as copies, but to show how to work and study

from nature. Any student who will draw from nature with such material to enthuse and suggest ways of working will not go astray, and will often be better off than if with a poor teacher or at a poor art school. The student who studies in this way at home may in a few years be far in advance of those who have studied an equal time under poor instruction.

This is possible because methods of work are often allowed to occupy the attention of art school students, so that their aim is not artistic, but mechanical, and it is possible for students to study many years in even noted art schools without obtaining the first idea of what art is or how they ought to work to secure artistic results. In the book "Modern Painting," which all art students ought to study, Mr. George Moore speaks of the noted English school at South Kensington as follows:

"Five and twenty years ago the schools of art at South Kensington were the most comical in the world; they were the most complete parody on the continental school of art possible to imagine. They are no doubt the same to-day as they were five and twenty years ago; any way, the educational result is the same. The schools as I remember them were faultless in everything except the instruction dispensed there. There were noble staircases, the floors were covered with cocoanut matting, the rooms admirably heated with hot-water pipes, there were plaster casts, and officials. In the first room the students practiced drawing from the flat. Engraved outlines of elaborate ornamentation were given them, and these they drew with lead pencils, measuring the spaces carefully with compasses. In about six months or a year the student had learned to use his compasses correctly, and to produce a fine, hard, black-lead outline; the harder and finer the outline, the more the drawing looked like a problem in a book of Euclid, the better the examiner was pleased, and the more willing was he to send the student to the room upstairs, where drawing was practiced from the antique.

"This was the room in which the wisdom of South Kensington attained a complete efflorescence. I shall never forget the scenes I witnessed there. Having made choice of a cast, the student proceeded to measure the number of heads; he then measured the cast in every direction, and ascertained by means of a plumb line exactly

where the lines fell. It was more like land surveying than drawing, and to accomplish this portion of his task took generally a fortnight, working six hours a week. He then placed a sheet of tissue paper upon his drawing, leaving only one small part uncovered, and, having reduced his chalk pencil to the finest possible point, he proceeded to lay in a set of extremely fine lines. These were crossed by a second set of lines, and the two sets of lines were elaborately stippled, every black spot being carefully picked out with bread. With a patience truly sublime in its folly, he continued the process all the way down the figure, accomplishing, if he were truly industrious, about an inch square in the course of an evening. Our admiration was generally directed to those who had spent the longest time on their drawings. After three months' work a student began to be noticed; at the end of four he became an important personage. I remember one who had contrived to spend six months on his drawing. He was a sort of demigod, and we used to watch him, anxious and alarmed lest he might not have the genius to devote still another month to it; and our enthusiasm knew no bounds when we learned that, a week before the drawings had to be sent in, he had taken his drawing home and spent three whole days stippling it and picking out the black spots with bread.

"The poor drawing had neither character nor consistency; it looked like nothing under the sun, except a drawing done at Kensington, — a flat, foolish thing, but very soft and smooth. But this was enough; it was passed by the examiners, and the student went into the Life Room to copy an Italian model as he had copied the Apollo Belvedere."

Similar censure has been deserved by other schools, and the student who is unable to study in an art school may console himself with the thought that he might waste much time if not fortunate enough to enter one of the right kind; and every student should understand, whether he studies at home or not, that he is and must be his own best teacher, and that if he has any ability or capacity for art he can develop it sufficiently by home study to know whether it will be wise for him to make art his life work. If he has not ability which will make itself evident by home study, no amount of study with teachers or in art schools will enable him to obtain results of

value, and art students ought to realize that their teachers can at best do but little for them. The best teacher cannot give the correct eye for drawing, the capacity to see color, or the feeling for beauty which the artist must have; and as a matter of fact, many of the greatest artists have been largely self-taught.

The student who desires to make art his profession must decide how to continue his studies. This is a perplexing question, for Mr. A will tell him to go abroad at once, and that there is no other way to study; while Mr. B will tell him to study in the schools of America for a few years and then go abroad; and Mr. C may tell him that it is not necessary to go abroad at all. The advice to go abroad at once is, however, so generally given that many students start for Paris, for instance, before they know anything concerning student life in that city, and often without knowledge of French and without having studied in the art schools of America. The student should realize that schools of art, like those for other specialties, will vary. Standards may be higher in one country than in another, but in most countries there will be good and poor schools. Schools of art are very much alike the world over, for they all deal with the grammar of art first, and as a matter of fact, in few schools will the student go far beyond this elementary study. This is due to the fact that art must come from within, — that it cannot be taught, and is due to the development of the perceptions and the soul, which is a matter of slow and individual growth. The student may study its grammar of form, light and shade, and color under practically the same conditions in the best schools of any country, and the chances are that he will make the best progress the first few years in the schools of his own country, for in them he is at home, and under none of the disadvantages of one in a foreign country. The American art student is advised to study in America until he can draw and paint fairly well, for he is more likely to obtain a sound foundation and artistic instruction, giving better results in all ways, in the first few years of art-school life here than abroad.

The principal value of study in Europe is due to the opportunity it gives to study with fellow-students who are really strong artists, and also to the inspiration of the galleries which exhibit the masterpieces of the world. But students who have not studied several years are

not able to profit by these advantages as are those with more experience, and consequently many students go abroad and study for several years, and return to America not knowing what they ought to have known before going abroad to profit by their study. The student is, then, advised to study in an art school at home for three or four years and then to go abroad for as long a period as he can, for there he is under the influences of the best art of the world and away from the petty jealousies and distractions of a business and inartistic atmosphere, which makes the best work more difficult in America than in Europe.

Many students begin the study of art who have not the money required for continuous study during several years. It is difficult to advise such students, for some may be situated so that they can support themselves while studying, and others cannot do this. Generally it will be difficult to study profitably if the mind cannot be wholly given to study, and it will be better for the student to work until he can study for a few years; while doing this he will have holidays and evenings in which to study, and in this time he may improve in drawing, if he cannot obtain the best results in art from a brain which is tired with other affairs. The student who has ability has the opportunity to compete for the scholarships given for foreign study, and often in this way he may continue his education.

But the art student with all other students should realize that nature is the great and only perfect teacher, and that success in any permanent form comes only from the free and honest expression of one's own individuality. In all directions the tendency is not to be honest and original, but to copy some other person, and it is too generally believed that nothing can be right if authority cannot be quoted for its support. Most people, instead of studying nature or the facts of any question to form their own opinions, study books and the opinions of others, and never think of questioning the views of accepted authorities. The absurdity of so doing is realized only by study of the past, whose records prove that upon all subjects opinions are continually changing; and even in the domain of science the accepted theories have been almost as numerous and as changeable as in that of religion. To-day, for instance, we discover that there is a light or force which enables us to see through wood, metal,

and other solid substances, and even through our own bodies, as if they were translucent. The elements are being divided, and we are so accustomed to the marvels of scientific invention that we should hardly be surprised if told that the problem of the ages has been solved, and gold produced from other substances. The records of the past prove an evolution of mind as well as matter, and show that the authorities have at different times supported many different and opposed views of the same subjects, and it will be possible to quote authority for almost any view of any subject that may be brought up.

In all ages advance has been due to those who have differed from popular opinion, to those who have discarded authorities and studied nature. The art student is earnestly advised to study the work of all great artists, and nature at the same time, and not to accept any views not in harmony with the opinions which he has founded upon his own careful study of nature. Students of art and science also will be wise to go to nature first and always, and never to accept theories concerning which their own study of nature occasions the least doubt or uncertainty.

It is often stated that the inventions of the last few years have been so numerous and so great that the end must soon be reached; but the student cannot accept this conclusion, and must believe that the end will never be reached, and that as long as man exists he will be adding to his knowledge until he has solved all the problems possible to conceive of now and many as yet not thought of. Who can say that the mysteries of life, death, the soul, and the future shall not some day be solved by the scientist, and life be much more joyful and the world infinitely more beautiful to those who then will be students of an art and science in which our present knowledge and power is merely the alpha of the results which the future will without doubt bring forth?

In the effort to hasten this day of knowledge, which is the day of power and happiness, let us exert all our energies to be serious and honest students, and thus workers for our own welfare and that of the world.

DEFINITIONS.

Aesthetics. The science which treats of the beautiful, and its various modes of representation in nature and art; the philosophy of the fine arts.

Accent. Emphasis of light or of dark in a light and shade drawing; of dark in an outline drawing; and of color or of light and dark in a color sketch.

Altitude. The perpendicular distance between the bases, or between the vertex and the base, of a solid or plane figure.

Angle. The difference in direction of two lines which meet or tend to meet. The lines are called the *sides*, and the point of meeting, the *vertex* of the angle.

An angle is measured by means of an arc of a circle described from its vertex as a center and included between its sides. The center of the arc is the vertex of the angle.

The angle formed by two radii of the circle which include an arc equal to $\frac{1}{360}$ of the circumference is taken as the unit for measuring angles, and is called a *degree*.

The degree is divided into sixty equal parts called *minutes*, and the minutes into sixty equal parts called *seconds*.

Degrees, minutes, and seconds are denoted by symbols. Thus 5 degrees, 13 minutes, 12 seconds, is written 5° 13′ 12″.

A RIGHT ANGLE is one which is formed by two radii which include $\frac{1}{4}$ of the circumference. It contains 90°. A *straight* angle is equal to two right angles and contains 180°.

ACUTE ANGLE. An angle less than a right angle.

OBTUSE ANGLE. An angle greater than a right angle.

OBLIQUE ANGLE. One which is not a right or a straight angle.

Apex. See Vertex. The summit, or highest point of an object.

Apparent Color. The color which any object appears to have.

Appearance. The image produced in the eye by the form, light and shade, or color of any object.

Arc. See Circle.

Arrangement. The orderly disposition of objects or forms.

Atmosphere. The effect of reality due to correct drawing and values artistically rendered.

Axis of a Solid. An imaginary straight line passing through its center and about which the different parts are symmetrically arranged.

Axis of a Figure. A straight line passing through the center of a figure, and dividing it into two equal parts.

Balance. The equality of parts, obtained by the proper distribution of lines or of light and dark.

Base. The opposite parallel polygons of prisms. The polygon opposite the vertex of a pyramid. The plane surfaces of cylinders and cones. The opposite parallel sides of a parallelogram or trapezoid. The shortest or longest side of an isosceles triangle, and any side in any other triangle, but usually the lowest.

Bisect. To divide into two equal parts.

Blend. To soften and bring together.

Blocking-in Lines. The lightest and simplest suggestions of the leading lines and masses of the subject.

Blur Glass. A magnifying glass of about 15 inches focus.

Brightness or Luminosity. The strength of the light sent to the eye by any color. A luminous or bright color sends a large amount of light to the eye.

Broken Color. Color changed by the addition of gray.

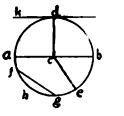
Breadth. Simplicity due to large masses which subordinate details to the spirit and effect of the whole.

Cast. An object made of plaster-of-Paris.

Center of Vision. The point on the picture plane directly opposite the station-point.

Chiaro-oscuro. The art of combining light and shade.

Circle. A plane figure bounded by a curved line, called a circumference, all points of which are equally distant from a point within called the *center*.



The boundary line is called the CIRCUMFERENCE.

DIAMETER. A straight line drawn through the center, and connecting opposite points in the circumference, as *a b*.

RADIUS. The distance from its center to the circumference, as *c e*.

SEMICIRCLE. Half a circle, formed by bisecting it with a diameter, as *a d b a*.

ARC. Any part of the circumference, as *e b*.

CHORD. A straight line whose ends are in the circumference, as *f g*.

SEGMENT. The part of a circle bounded by an arc and a chord, as *f h g f*.

SECTOR. The part of a circle bounded by two radii and an arc, as *b e c b*.

QUADRANT. A sector bounded by two radii and one fourth of the circumference, as *a c d a*.

TANGENT. A straight line which meets a circumference, but being produced does not cut it, as *k d*. The point of meeting is called the *point of contact* or *point of tangency*.

Cold Colors. Those in which blue predominates.

Color. The result of the decomposition of light into the various elements composing it. It is a sensation due to the effects produced upon the eye by the waves of different lengths found in light, and does not exist outside of ourselves. Practically we speak of material color as that which decomposes light, and most objects are colored in the sense that they decompose light and send to the eye rays which are not white. Thus a body which reflects all the rays equally is white; one which absorbs all the rays except the red rays is red; and one which absorbs all the rays except the blue is blue; and one which absorbs practically all the rays is black.

Composition. The arrangement of the different lines, parts, and masses of a subject.

Concave. Curving inwardly.

Cone. A solid bounded by a plane surface called the *base*, which is a circle, ellipse, or other curved figure, and by a lateral surface which is everywhere curved, and tapers to a point called the *vertex*. Its base names the cone. Thus a circular cone is one whose base is a circle.

A RIGHT CIRCULAR CONE is generated by an isosceles triangle which revolves about its altitude as an axis. The equal sides of the triangle in any position are called *elements* of the surface. The length of an element is called the *slant height* of the cone. Unless otherwise stated, "cone" means a right circular cone.

Constructive Drawing. A drawing intended for the workman who is to make the object.

Contour. The outline or periphery of the appearance of an object.

Contrast. The effect due to the juxtaposition of different lines, different forms, different masses of light and dark, or different colors.

Conventionalization. In art, the expression of the spirit and important truths of nature by a subordination of less important features.

Convergence. Lines extending toward a common point, or planes extending toward a common line.

Convex. Rising or swelling into a spherical or rounded form.

Corner. The point of meeting of the edges of a solid, or of two sides of a plane figure.

Cylinder. A solid bounded by a curved surface and by two opposite faces called bases; the bases may be ellipses, circles, or other curved figures, and name the cylinder. Thus a circular cylinder (the ordinary form) is one whose bases are circles.

A RIGHT CIRCULAR CYLINDER is generated by the revolution of a rectangle about one side as an axis. The side about which the rectangle revolves is called the *height* of the cylinder, also its *axis*. The side opposite the axis describes the curved surface of the cylinder, and in any of its positions is called an *element* of the surface.

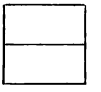
Cut up. Having its effect destroyed by exaggerated detail.

Design. Any arrangement or combination to produce desired results in industry or art.

Diagonal. A straight line in any polygon which connects vertices not adjacent.

In regular polygons, diagonals are called *long* when they pass through the center, as *c d*, and *short* when they extend between parallel sides, as *a b*.

Diameter. See Circle. In a regular polygon with an even number of sides a line joining the centers of two opposite sides is often called a diameter.



Distorted. Different from the image in the eye and producing an unsatisfactory impression of the object.

Diverging Lines. Lines extending from a common point.

Dividing Line of Light and Shade. A line composed of the edges or of the edges and the elements which separate the surface in light from the surface in shadow.

Drawing. Any representation of nature by means of outline, light and shade, or color; but outline or light and shade is usually understood.

Dry Brush. The use of a brush which is barely moist with water color.

Edge. The intersection of any two surfaces. The boundary line. Edges are straight or curved, and are represented by lines.

Element. See Cylinder and Cone.

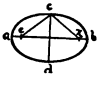
" CONTOUR. One which forms part of the contour.

" GLITTER. One which has the highest light upon it.

" SHADOW. One which forms part of the dividing line of light and shade.

Elevation. A drawing made on a vertical plane by means of projecting lines perpendicular to the plane from the points of the object. The terms elevation, vertical projection, and front view all have the same meaning.

Ellipse. A plane figure bounded by a line such that the sum of the distances of any point in it, as *c*, from two given points *e* and *f*, called *foci*, is equal to a given line, as *a b*. The point midway between the foci is called the *center*.



The TRANSVERSE AXIS of an ellipse is the longest diameter that can be drawn in it, as *a b*. It is also called the *major* or *long* axis.

The CONJUGATE AXIS is the shortest diameter which can be drawn, as *c d*. It is also called the *minor* or *short* axis.

The FOCI, *e* and *f*, are situated in the long diameter, and the distance of each focus from *c* or *d* is equal to one half *a b*.

Face. One of the plane surfaces of a solid. It may be bounded by straight or curved edges.

Finishing. Completing a drawing, whose lines or masses have been determined, by representing details and by strengthening and accenting where this is required.

Fixatif. A thin varnish used to fix charcoal drawings.

Foreshortening. Apparent decrease in length, due to a position oblique to the visual rays.

Free-hand. Executed by the hand, without the aid of instruments.

Gradation. A gradual change from light to dark, or from one color to another.

Group. Any collection of objects to be studied.

Handling. See Technique.

Hard. Any study of nature is hard, crude, or mechanical when its outlines are too keen, or when objects are outlined with light or with dark, or are false in values.

Harmony. The pleasing arrangement of lines, light and dark, or color.

Half-tint. The shading produced by means of parallel equidistant lines.

Horizon. In pictorial art, a horizontal line at the level of the eye.

Horizontal. Parallel to the surface of smooth water.

In drawings, a line parallel to the top and bottom of the sheet is called horizontal.

Instrumental. By the use of instruments.

Key. The scale of light and dark, or color.

Lateral Surface. The surface of a solid, excluding the base or bases.

Lateral Edge. One not bounding a base.

Light. The agent which produces vision. Light is supposed to travel in straight lines by means of minute undulations or waves in the particles of ether which fill all space. A ray of solar light is composed of a large number of differently colored rays of light, which uniting form white light.

LIGHT, MASS OF. The entire surface whose effect, in constrast with the shadows, is that of strong light. It is designated by the word "light."

" HIGH, or GLITTER. The brightest part of any surface — the part that glitters.

" HALF. The part intermediate in value between the shadow and the light.

" DIRECT. Rays from the sun, moon, or any artificial light. In a studio, rays from the window.

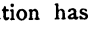
" INDIRECT. Rays reflected to any object from surrounding objects.

Local color. The actual color of the light which is not absorbed by any object. This color is visible when the object is near the eye and does not reflect colored light received from any other object.

Level of the Eye. The level or position of a horizontal plane passing through the spectator's eye.

Line. A line has length only. In a drawing its representation has width, but is called a line.

LINE, STRAIGHT. One which has the same direction throughout its entire length.



" CURVED. One no part of which is straight.

" BROKEN. One composed of different successive straight lines.

" MIXED. One composed of straight and curved lines.

Medium. The pencil, crayon, color, or other material used to produce the drawing.

Model. An object used for study.

Monochrome. A painting in one color.

Neutral Color. Color which is not pure or bright.

Opaque Color. Pigment having a body which hides the surface receiving the color.

Painting. A representation of values made by the use of the brush and color. It may be in monochrome or in color.

Parallel. Having the same direction and everywhere equally distant.

Parallelogram. See Quadrilateral.

Perpendicular. At an angle of 90°.

Perspective. The art of representing on a surface the appearances seen from any given position.

LINEAR. The art of making upon a plane, called the *picture plane*, such a representation of objects that the lines of the drawing appear to coincide with those of the object, when the eye is at one fixed point called the *station-point.*

AËRIAL. The art of representing nature's effects by light and shade, or by color.

DIAGRAM. A linear perspective obtained scientifically by perspective methods. It is often very false pictorially when not seen from the station-point.

PARALLEL. A linear perspective which represents a cubical object by the use of one vanishing-point (the center of vision), and a surface parallel to the picture plane by its real shape.

ANGULAR. A linear perspective which represents a cubical object by the use of two vanishing-points on the level of the eye.

OBLIQUE. A linear perspective which represents a cubical object by the use of three vanishing-points, not more than one being on the level of the eye.

FREE-HAND or MODEL DRAWING. A drawing which, without confining the eye to the station-point, represents as far as possible the actual appearances of objects. It is made free-hand, and is more satisfactory than an exact diagram perspective, except when subjects causing very large visual angles are to be represented.

Plan. Plan, horizontal projection, and top view have the same meaning, and designate the representation of an object made on a horizontal plane by means of vertical projecting lines. In architecture it means a horizontal section.

Plane Figure. A part of a plane surface bounded by lines.

Plinth. A cylinder or prism whose axis is its least dimension. It is *circular*, *triangular*, *square*, etc., according as it has circles, triangles, squares, etc., for bases.

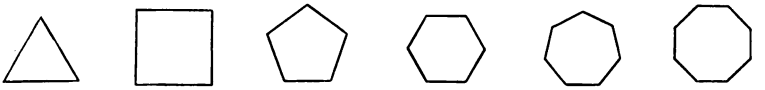
Polygon. A plane figure bounded by straight lines.

An EQUILATERAL POLYGON is one whose sides are all equal.

An EQUIANGULAR POLYGON is one whose angles are all equal.

A REGULAR POLYGON is one which is equilateral and equiangular.

PARALLEL POLYGONS are those whose sides are respectively parallel.



1. 2. 3. 4. 5. 6.

TRIANGLE. A polygon having three sides (1).

QUADRILATERAL. A polygon having four sides (2).

PENTAGON. A polygon having five sides (3).

HEXAGON. A polygon having six sides (4).

HEPTAGON. A polygon having seven sides (5).

OCTAGON. A polygon having eight sides. (6).

NONAGON. A polygon having nine sides.

DECAGON. A polygon having ten sides.

UNDECAGON. A polygon having eleven sides.

DODECAGON. A polygon having twelve sides.

The center of a regular polygon is the common intersection of perpendiculars erected at the middle points of its sides.

The polygons represented in the figures are regular polygons.

Prism. A solid bounded by two equal parallel polygons, having their equal sides parallel, and by three or more parallelograms.

The polygons are called the *bases* of the prism, the parallelograms the *lateral faces*, the intersections of the lateral faces, the *lateral edges*.

Prisms are called *triangular*, *square*, *pentagonal*, etc., according as the bases are triangles, squares, pentagons, etc.

A RIGHT PRISM is one in which the edges connecting the bases are perpendicular to the bases.

An OBLIQUE PRISM is one in which the edges connecting the bases are not perpendicular to the bases.

A REGULAR PRISM is a right prism whose bases are regular polygons.

The ALTITUDE of a prism is the perpendicular distance between the bases.

The AXIS of a regular prism is a straight line connecting the centers of its bases.

Profile. The contour outline of an object.

Projection, orthographic. The view or representation of an object obtained upon a plane by projecting lines perpendicular to the plane.

Pure or **Normal Colors.** The spectrum colors.

Pyramid. A solid of which one face, called the *base*, is a polygon, and the other faces, called *lateral faces*, are triangles having a common vertex called the *vertex* of the pyramid. The intersections of the lateral faces are called the *lateral edges*.

A pyramid is called *triangular*, *square*, etc., according as its base is a triangle, square, etc.

A REGULAR PYRAMID is one whose base is a regular polygon and whose vertex is in a perpendicular erected at the center of the base. Its other faces are equal isosceles triangles. The altitude of any of these triangles is called the *slant height* of the pyramid.

The AXIS of a regular pyramid is a straight line connecting the vertex and the center of the base.

The ALTITUDE of a pyramid is the perpendicular distance from the vertex to the base.

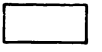
Quadrilateral. A plane figure bounded by four straight lines. These lines are the *sides*. The angles formed by the lines are the *angles*, and the vertices of these angles are the *vertices*, of the quadrilateral.

A PARALLELOGRAM is a quadrilateral which has its opposite sides parallel.

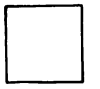
A TRAPEZIUM is a quadrilateral which has no two sides parallel.

A TRAPEZOID is a quadrilateral which has two sides, and only two sides, parallel.

A RECTANGLE is a parallelogram whose angles are right angles.



A SQUARE is a rectangle whose sides are equal.



A RHOMBOID is a parallelogram whose angles are oblique angles.

A RHOMBUS is a Rhomboid whose sides are equal.

The side upon which a parallelogram stands and the opposite side are called respectively its *lower* and *upper bases.*

Reflected Light. The part of the shadow of any object which is lightened by rays reflected to it from some other object.

Rendering or **Handling.** The way in which a medium is used.

Representation. Any kind of drawing, painting, or sculpture.

Retreating. Going away from.

Section. A projection upon a plane parallel to a cutting plane which intersects any object. The section generally represents the part behind the cutting plane, and the cut surfaces are represented by cross-hatching.

Shade. See Half Light. Also a tone of a color produced by the addition of black pigment to material colors, and by the action of a feeble light upon immaterial colors.

Shadow. The part of any surface which appears dark in consequence of receiving no direct light.

SHADOW, CAST. The shadow projected upon one object by another.

Simple. Not giving too much or exaggerated detail.

Sketch. A hasty and unfinished drawing.

" TIME. A sketch made in a specified time.

Solid. A solid has three dimensions, length, breadth, and thickness. It may be bounded by plane surfaces, by curved surfaces, or by both plane and curved surfaces. As commonly understood, a solid is a limited portion of space filled with matter, but geometry does not consider the matter, and deals simply with the shapes and sizes of solids.

Sphere. A solid bounded by a curved surface every point of which is equally distant from a point within called the center.

Still Life. Objects intended for use or ornament.

Stippling. Filling in the space between hatching lines, or producing an effect, by means of dots.

Study. Any carefully finished drawing or painting.

Subject. Any object, group, or effect of nature to be represented by the artist.

Surface. The boundary of a solid. It has but two dimensions, length and breadth.

Surfaces are plane or curved.

A PLANE SURFACE is one upon which a straight line can be drawn in any direction.

A CURVED SURFACE is one no part of which is plane.

The surface of the sphere is curved in every direction, while the curved surfaces of the cylinder and cone are straight in one direction.

Tangent. A straight line and a curved line, or two curved lines, are tangent when they have one point common and cannot intersect; lines or surfaces are tangent to curved surfaces when they have one point or one line common and cannot intersect.

Test. Any process used to prove the work.

Tint. A tone of a color produced by the addition of white to oil colors, water to water colors, and of white light to the immaterial colors of the spectrum.

Technique. The handling or way in which an effect is obtained.

Texture. The character of a surface.

Tone. Tone designates the changes which color undergoes by the addition of white, which lightens, or of black, which darkens its normal tone. The word also means the effect of some predominating color produced by the color of the light which illuminates the object.

SELF TONES. Tones of the same color.

Transparent Colors. Those in which the color tints the paper or canvas, which shows through the color, and acts with it in producing the effect.

Triangle. A plane figure bounded by three straight lines. These lines are called the *sides*. The angles that they form are called the *angles* of the triangle, and the vertices of these angles, the *vertices* of the triangle.

Triangles are named by their sides and angles.

A SCALENE TRIANGLE is one in which no two sides are equal.

An ISOSCELES TRIANGLE is one in which two sides are equal.

An EQUILATERAL TRIANGLE is one in which the three sides are equal.

A RIGHT TRIANGLE is one in which one of the angles is a right angle.

An OBTUSE TRIANGLE is one in which one of the angles is obtuse.

An ACUTE TRIANGLE is one in which all the angles are acute.

The HYPOTENUSE is the side of a right triangle opposite the right angle. The other sides are called the *legs*.

An EQUIANGULAR TRIANGLE is one in which the three angles are equal. The value of each angle is 60°.

The BASE is the side on which the triangle is supposed to stand. In an isosceles triangle, the equal sides are called the *legs*, the other side the *base*; in other triangles any one of the sides may be called the base.

The ALTITUDE is the perpendicular distance from the vertex to the base. Except in the isosceles triangle, there are three altitudes.

The vertex of the angle opposite the base is often called the *vertex* of the triangle.

Trisect. To divide into three equal parts.

Type Form. A perfect geometrical plane figure or solid.

Value. In color the relative amount of light contained in different colors. The strongest value is the lightest.

As used by artists the word generally means the difference in effect due to any cause whatever, as light, color, shadow, atmosphere, etc.

A flat value is one with no gradation.

Vanish. To extend towards a vanishing point.

Vanishing. Converging towards one point or line.

" POINT. A point towards which parallel lines converge.

Variety. The effect due to the combination of parts which are not alike.

Vertical. Upright, or perpendicular to a horizontal plane or line. Vertical and perpendicular are not synonymous terms.

Vertex. See Angle, Quadrilateral, Triangle. The vertex of a solid is the point in which its axis intersects the lateral surface.

View. See Elevation. Views are called front, top, right or left side, back, or bottom, according as they are made on the different planes of projection. They are also sometimes named according to the part of the object shown, as edge view, end view, or face view.

Visual Ray. A single ray or line of light from any object to the eye.

" ANGLE. The angle formed at the eye by the outer visual rays from any object.

Warm Colors. Those in which red and yellow predominate.

Working Drawing. One which gives all the information necessary to enable the workman to construct the object.

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